

AGRICULTURAL

Chemicals

Pesticides for 1959

Special Tests in Service

Forest Pest Control

Injection Feeding

Agricultural Trade

SA & Marketing

New Agricultural Chemicals

Editorial Index

DECEMBER 1958





**BIG PART
OF U.S.**

Architect's rendering of the new
Bagpak plant in Litchfield, Ill.

**GETS FAST,
SHORT-HAUL
DELIVERIES OF
INTERNATIONAL
MULTIWALL
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You benefit directly from International Paper's modern, new Bagpak plant in Litchfield, Illinois.

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**INTERNATIONAL
PAPER**

BAGPAK DIVISION, N. Y. 17, N. Y.



Progress Report

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We are happy to announce that our first shipments of Canadian Muriate will be made in late December.

Two sources of supply from one company are now a reality—Carlsbad, U.S.A. and Saskatoon, Canada.



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Muriate
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HEPTACHLOR
Insect Control Forum

HEPTACHLOR
insecticide
NEWSLETTER

HEPTACHLOR
INSECT CONTROL GUIDE SHEET

SUBJECT 1
GRASSHOPPERS

NEW NEWS!
WE'D LIKE YOUR VIEW

FREE
HEPTACHLOR
INSECT CONTROL FORUM

FREE
HEPTACHLOR
DEALER SALES-BUILDER
PROGRAM

FREE
HEPTACHLOR
INSECT CONTROL GUIDE SHEETS

APPEARANCE

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Expanded Heptachlor educational programs are one of the many reasons why Heptachlor will be used in greater quantity in 1959. These educational programs, started late in 1958, have received amazing acceptance. The programs deal with insecticides, insects, and insect control. As a result, major sales influences at the local level will back insect control more actively through increased knowledge.

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A different guide sheet is distributed each month as part of the Forum and Dealer Programs. Each tells about a specific insect.

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Company _____

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AGRICULTURAL CHEMICALS



This Month's Cover

Top Photo: Free ammonium nitrate, a new development of Monsanto Chemical Co., is trademarked Lion E-2. See story on page 66.

Lower Photo: (Courtesy U.S.D.A.) Workers unloading filled 4-gallon cans of insecticide for forest pest control. See story page 28.

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Vol. 13, No. 12

December, 1958

AGRICULTURAL

Chemicals

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Trade Listing

National Agricultural Chemicals Association, Association Building, 1145 19th St., N.W., Washington, D. C. Lea Hitchner, executive secretary.

National Plant Food Institute, 1700 K St., N. W., Washington, D. C. Paul Truitt and Russell Coleman, executive vice-presidents.

Regional Offices listed on page 117.

American Society of Agronomy, 2702 Monroe St., Madison Wisc. L. G. Monthey, executive secretary.

American Phytopathological Society, S. E. A. McCallan, secretary, Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society, 1155 16th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C., William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute, Hotel Claridge, Room 305, Memphis, Tenn., Jack Criswell, executive vice president.

American Society of Agricultural Engineers, F. B. Lanham, secretary, 505 Pleasant St., St. Joseph, Mo.

Carolinas-Virginia Formulators Association, 516 S. Salisbury St., Raleigh, N. C. Hugh Horn, secretary-treasurer.

California Fertilizer Association, Sidney Bierly, executive secretary, Suite 1, Boothe Building, 475 Huntington Drive, San Marino California.

Chemical Specialty Manufacturers' Association, 110 East 42nd St., New York City, Dr. H. W. Hamilton, secretary.

Entomological Society of America, 1530 P. Street N. W., Washington, D. C., R. H. Nelson, secretary.

National Nitrogen Solutions Association, 2217 Tribune Tower, Chicago, Ill. M. F. Collie, secretary.

National Cotton Council, PO Box 9905, Memphis, Tenn.

Soil Science Society of America, 2702 Monroe St., Madison, Wisc. L. G. Monthey, executive secretary.

Weed Society of America, W. C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

Western Agricultural Chemicals Association, Charles Barnard, executive secretary, 2466 Kenwood Ave., San Jose, Calif.



*In the
Spotlight
this Month*

- **New Pesticides . . .** *Agricultural Chemicals* reviews new developments for the pesticide formulator,—some products still in the developmental and testing stage,—and others ready for field use. Included are the new microbial insecticides, and trade-named products such as: Emmi, Tryben 200, Glyodin, Invertron, Mylone, Delnav, Cyprex, Sytam, Ozoban, Trolene, Dibrom, Phosphamidon, Herbisan A, Phaltan, Kelthane, Terrachlor, and Dowicide A. Page 36.
- **Injection Fertilization . . .** Emergency measures to control diet deficiencies in plants are applied effectively through "hypodermic" techniques. Injectants now find practical application in control of chlorosis. Page 37.
- **Economic Trends . . .** What happens when there are too many suppliers and too few dealers? Farmer-dealers and direct sale by manufacturer to end user are two of the results. When the farmer is a better credit risk than his dealer it is no trick for him to find a manufacturer willing to sell him on a dealer basis. Ready cash is hard to turn down in any market. Page 45.
- **Fertilizer Round Table . . .** Over 300 fertilizer plant production men exchange ideas on economics of formulation, production and maintenance. Review of superphosphoric acid sources and costs among discussion highlights. Page 30.
- **Forest Pest Control . . .** Prevention is the first step, but no matter how thorough the job of checking pests by indirect measures,—direct control (usually involving chemicals) is usually necessary too. In 1957, pesticides for forest application totalled some two million pounds. Page 28.
- **New Chemicals . . .** A joint meeting of the National Agricultural Chemicals Association and Commercial Chemical Development Association features the theme, "New Chemicals for Agriculture." New growth regulators, herbicides, fungicides, insecticides, animal feed supplements, animal health products, are reviewed by industry experts. Page 40.



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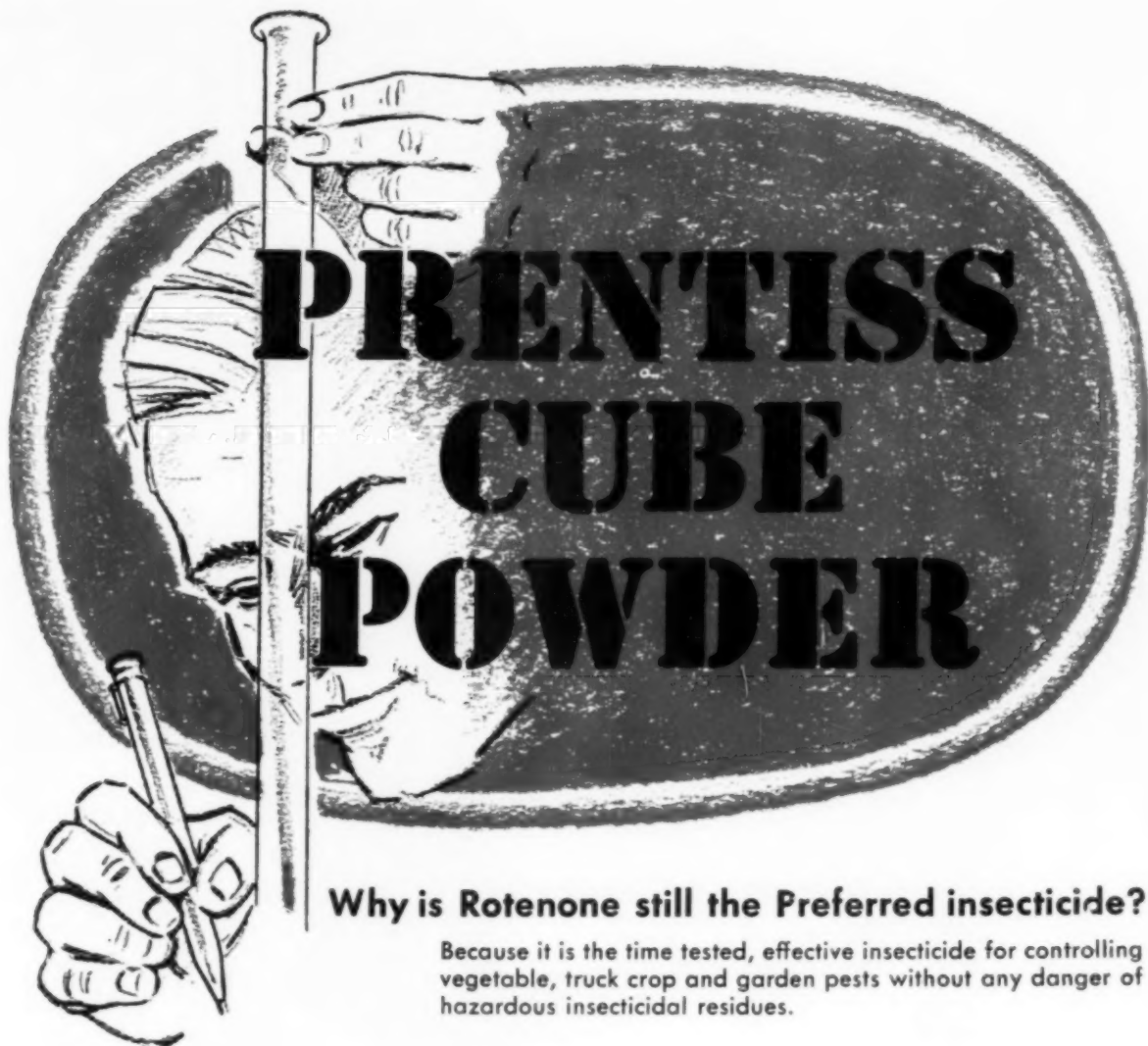
Southwest Potash Corporation

41 BROADWAY • NEW YORK 6, N. Y.

MEETING CALENDAR

- Dec. 1-4—Entomological Society of America, Sixth Annual Meeting, Hotel Utah, Salt Lake City, Utah.
- Dec. 3-4—North Central Weed Control Conference, Netherland Hilton Hotel, Cincinnati.
- Dec. 3-5 — Agricultural Ammonia Institute, Annual Meeting, Morrison Hotel, Chicago.
- Dec. 4-5—Southeastern Conference on Mineral Nutrition of Forest Trees, Duke Univ., Durham, N. C.
- Dec. 8-10—Washington State Horticultural Association, Yakima, Wash.
- Dec. 9-11—Chemical Specialties Manufacturers Assn., Annual Meeting, Commodore Hotel, New York.
- Dec. 17-18 — Beltwide Cotton Production Conf., Rice Hotel, Houston, Texas.
- Dec. 25-30—American Association for the Advancement of Science, 125th Annual Meeting, Washington, D. C.
- January 7-8—Fertilizer Short Course at Iowa State College. Sponsored by Iowa Extension Service, Ames, Iowa.
- Jan. 7-8—Insect Control Conf., Mississippi State University, State College, Miss.
- Jan. 7-9 — Northeast Weed Control Conference, Hotel New Yorker, New York.
- Jan. 9-10—Association of Southern Feed and Fertilizer Control Officials, Velda Rose Motel, Hot Springs, Ark.
- January 12-13 — Ohio Pesticide Institute, Annual winter meeting, Neil House, Columbus, Ohio.
- Jan. 20-22, 1959 — California Weed Conference, Santa Barbara, Cal.
- Jan. 20-23—Western Cooperative Spray Project, Benson and Imperial Hotels, Portland, Ore.
- Jan. 21-22—Northwest Agricultural Chemicals Industry Conference, Benson Hotel, Portland, Ore.
- January 23-30 — Purdue Pest Control Conference, Purdue University, Agricultural Hall, Lafayette, Indiana.
- Jan. 27-28—Soil Science Society of North Carolina, Williams Hall, N. C. State College, Raleigh, N. C.
- January 28-29 — Illinois Custom Spray Operators' Training School, University of Illinois, Urbana, Ill.
- January 29-30 — Colorado Agricultural Chemicals Association, Cosmopolitan Hotel, Denver, Colo.
- January 30-February 1 — Eastern School of Retail Management and Trade Show (formerly the Garden Supply Trade Show), Hotel Statler, New York City.
- Feb. 10-12—Texas Agricultural Chemicals Conference, Texas Tech College, Lubbock, Tex.
- Feb. 24-25—Alabama Pest Control Conference, API campus, Auburn, Ala.

AGRICULTURAL CHEMICALS



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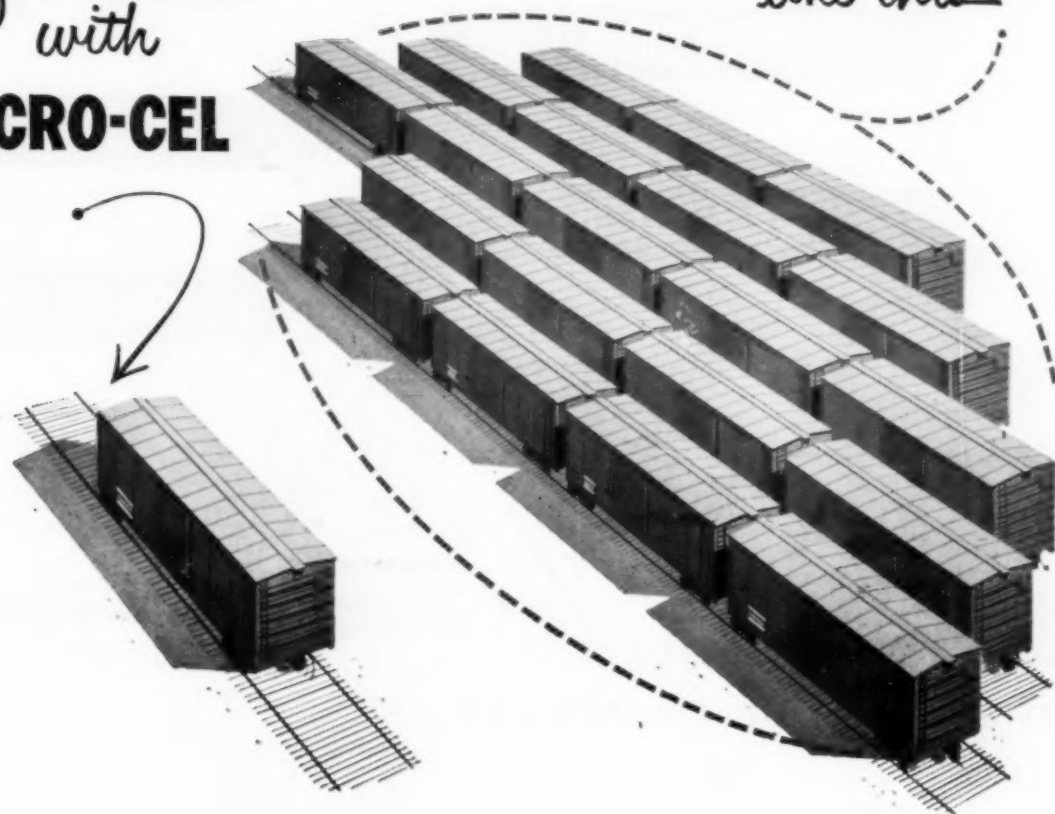
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You expect more from



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Were you there when the profits were handed out?

These all contain Tabatrex

More than 2,000,000 gallons of these cattle sprays were bought by dairy farmers last summer. These are just a few of the different brands that had one important ingredient in common, an ingredient that meant *extra sales and extra profits.*



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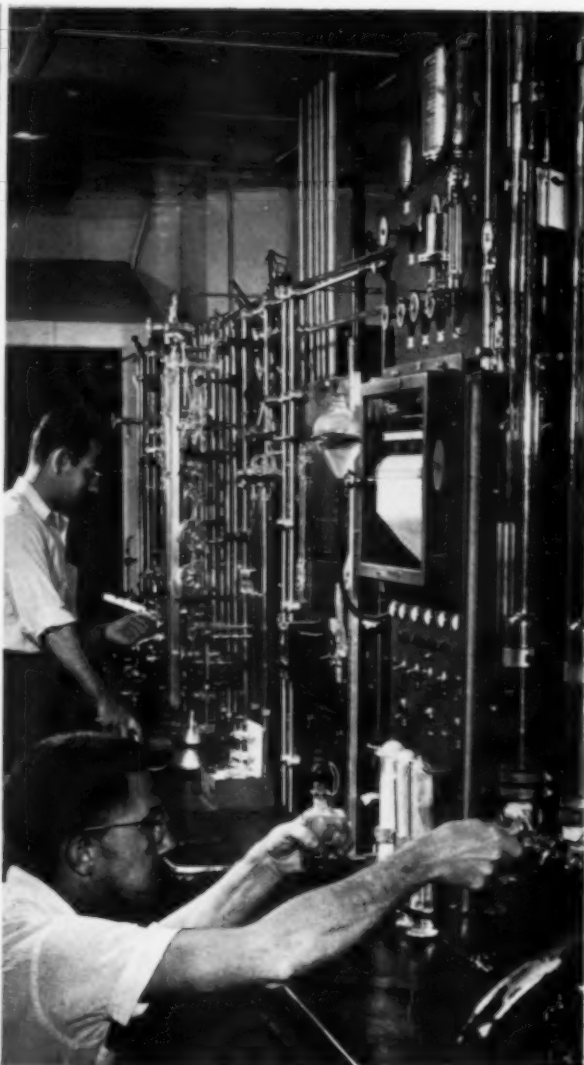
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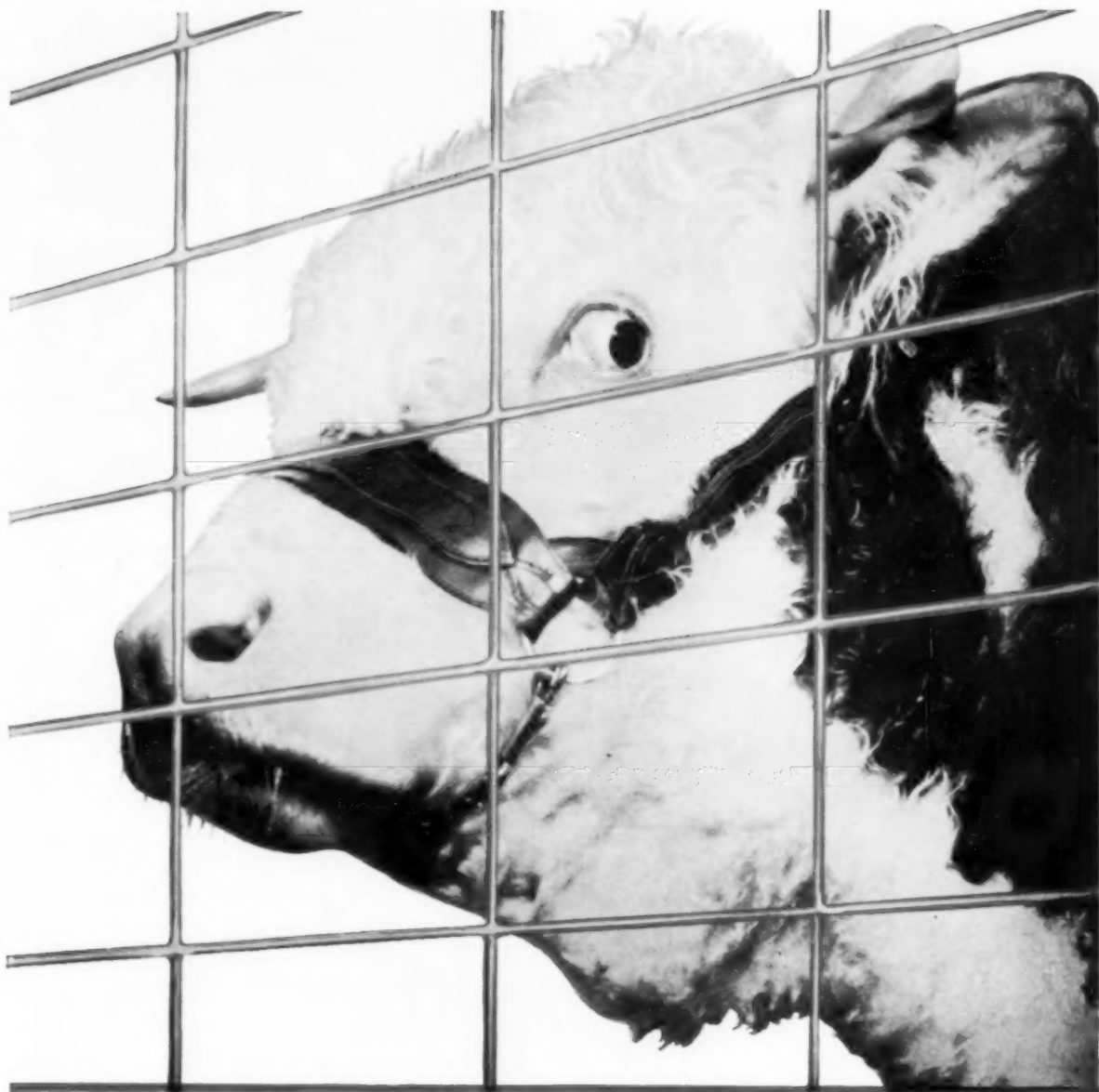
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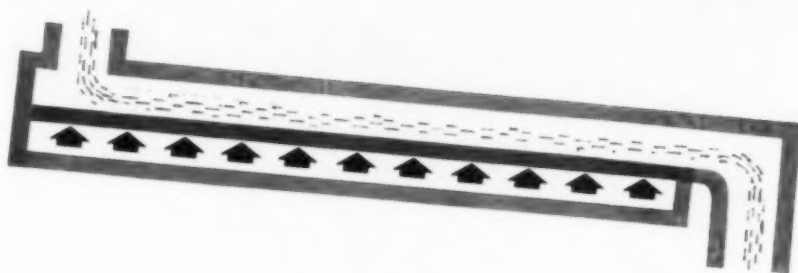
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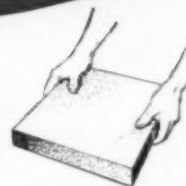
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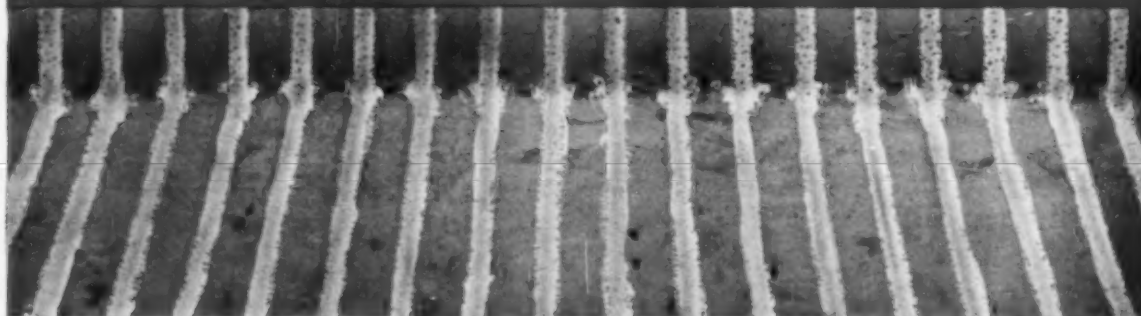
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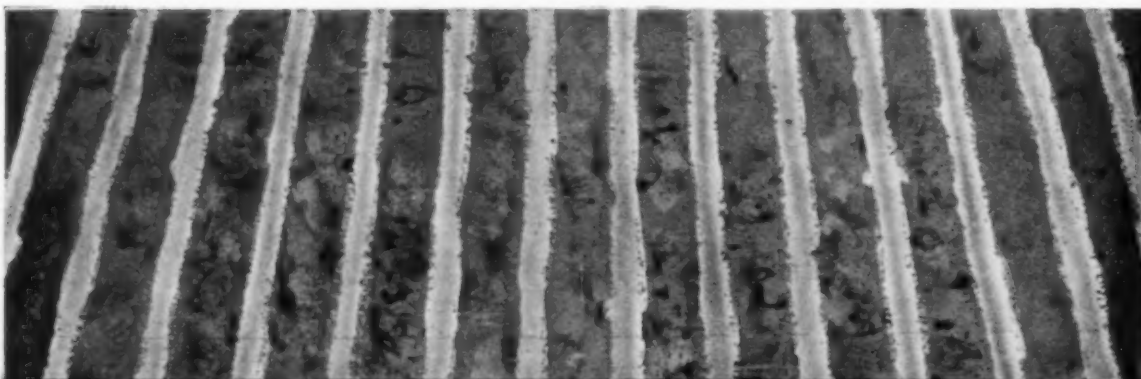
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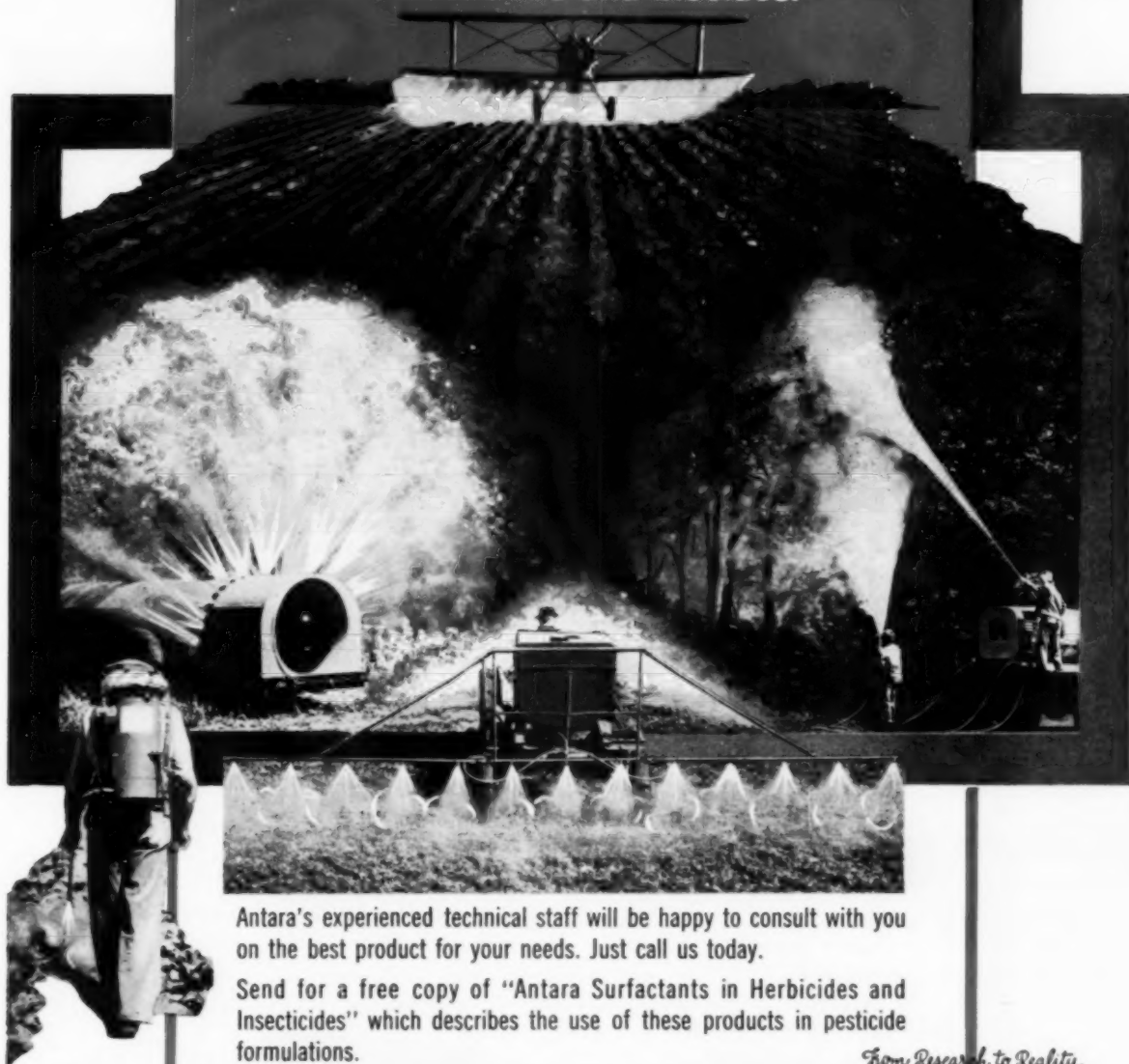
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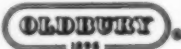
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EDITORIALS



PRODUCERS of basic toxicants, and formulators as well, seem to be in general agreement that business in insecticides was fairly satisfactory during 1958, at least so far as volume of sales was concerned. Unfortunately, the same cannot be said of profit margins. Price levels on many of the pesticides which move in substantial volume remained low, and particularly when related to the substantial investment required in the insecticide business, percentage return was generally inadequate.

Historically the insecticide business has always been one in which stock turnover is slow, inventories are burdensome and credit is long-term. What might be a normal and satisfactory percentage return in another field can be mighty skimpy in the pesticide business where the seller assumes the inventory responsibility, waits for payment until harvest time, and in too many cases is never actually certain that the goods aren't going to come back for credit.

It is some times lost sight of that there are two ways to raise profit percentages.—by lifting the actual dollar return, or by lowering the overall investment and thus improving the profit ratio. Whether or not the industry can do much about prices, as long as by-product chlorine seeks an outlet, it should still be possible to make some progress toward improving the profit picture by a few intelligent revisions in present selling and credit policies.

The industry seems in general agreement as to what the bad practices are. Consignment of materials and excessively long-term credits rate high on the list. What is needed now is some positive action to abandon the policies that all agree are bad. We are happy to be able to report that in at least one section of the market, this past season, consignment was eliminated.

It would be a great thing for the industry, we believe all will agree, if consignment selling were to disappear completely before the next season rolls around, starting right in at the level of the supplier of technical toxicants. Equally sound would be general recognition of the idea that extending credit is a matter for the banks to handle,—not the insecticide supplier!

CONSIDERABLE publicity has been given recently to the subject of bulk distribution of fertilizers, and some rather extravagant statements have been made as to how much the farmer can save in time, convenience and money by switching from his conventional bagged fertilizer to bulk applications. Such schemes as this always sound very pretty on paper, but don't always work out as well in practice. What happens, we wonder, if we have a nice wet spring, the ground is muddy as it was in so many sections last spring and there is no chance to get in with heavy spreading equipment?

We think too of the high cost of this mechanized applying equipment, and the rapid depreciation it suffers in the field; the fact that it would be in use for a relatively short period, when every farmer would want to get his fertilizer in at the same time—then lie idle the rest of the year. And could the farmer ever be absolutely sure, we wonder, of what had actually gone on his land? With bagged fertilizer he sees the grade designation on the label; he buys a particular brand in which he has confidence, for farmers too are brand conscious.

Of course if he buys his bulk fertilizer from a firm whose reputation is unassailable, perhaps he could never need to have any misgivings. But—when competition gets sharp and the business

(Continued on Page 119)



FOREST PEST CONTROL

OF the thousands of disease and insect species found within our forests, most are harmless, and some are even beneficial. A great many live on dead trees and on fallen limbs and other debris that litter the forest floor. They thus hasten the disintegration of dead material and make room for new growth. Many others prey upon destructive pests and hold them in check.

However, a certain number of disease and insect species become distinctly harmful when they attack healthy or weakened trees and impair their growth and vitality, deform them, or kill them. While only a few species cause serious damage, when those few go on a rampage, as they frequently do, they tax the ingenuity of biologist and forester alike in devising ways and means for stopping their depredations.

The sporadic behavior of pests in the forest indicates that complex factors govern their development. Parasites, predators, unfavorable weather, resistance of trees due to growth-vigor or other factors, all tend to hold pests in check. On the other hand, nature's balances are sometimes broken. The beneficial pests or other enemies of harmful species may become reduced; resistance of trees may be lowered through

drought, fire, or stagnation; large quantities of slash or wind-thrown timber may become available as breeding grounds; or climatic factors may become especially favorable. These conditions set the stage for destructive pests to multiply. This they have the capacity to do swiftly and in great volume when conditions are right. Man, himself, at times aggravates serious pest outbreaks, by his method of using the forest. So, we have outbreaks of destructive pests to subdue, as well as fire, in providing adequate protection to the Nation's forests.

Huge Losses From Forest Pests

ESTIMATES of the monetary value of wood material, and aesthetic values that are destroyed annually by forest pests are subject to many variables. The money value of forest products fluctuates like that of other commodities, according to demand, availability and the buying power of the dollar; the aesthetic value of trees destroyed in parks and recreational areas can seldom be expressed in terms of money, but they are known to be great.

The recent Timber Resource Review, conducted by the U.S. Forest Service in collaboration with State forestry organizations and private timber owners, pin-

points for the first time the tremendous toll taken by destructive bugs and blights. In an average year, diseases and insects killed outright 7.3 billion board feet of sawtimber in this country, and caused an estimated additional loss in growth of another 21.2 billion board feet. Together, these losses present the staggering total of 28.5 billion board feet of sawtimber and other wood products going down the drain every year. Then consider this—the loss of an agricultural crop can be replaced in a year or so, to replace a pest-killed forest may take one hundred years.

Tomorrow, the Nation's need for timber and its other needs for forest trees will be strikingly greater than today, or at any time in the past. We have the potential to meet that need if we fully apply our forestry knowledge and skills promptly. A part of the job, a big part of it, will be to plug the drain inflicted by the pests of the forest—destructive diseases and insects.

Prevention, First Step to Control

PREVENTION is the starting point with pest control, just as it is with fire. If he is sufficiently interested and acts promptly, man can, by his manipulation of the forest environment through cultural practices, keep many destructive diseases and insects from mul-

tipling to dangerous levels. Healthy, rapid-growing thrifty trees are less susceptible to attack by insects and diseases than are slow-growing, overcrowded, and over-mature trees. In old growth, forests, much can be done to lessen pest damage by avoiding injury to residual stands in logging operations, by proper disposal or treatment of logging slash, by avoiding other weakening influences, and by removing trees most sus-

ceptible to attack; and through logging, to regulate forest composition, and density. In a managed stand, the age at which certain tree species become susceptible to attack by insects, or damaged by wood-rotting fungi, can be taken into consideration by a cutting rotation that will remove the tree crop before the pest hazard becomes too great. In plantations, consideration can be given to the selection of proper growing sites,

and the planting of tree species best adapted to them. Attention can also be given to proper spacing and thinning to keep the growing stand vigorous and healthy.

Biological Control

PITTING insects against insects, or diseases against insects, or insects and diseases against diseases to serve man, is an intriguing field. There have been examples of outstanding success. Unfortunately, however, there have been more examples of failures than of successes.

The application of biological controls will be dependent largely upon what is discovered by research as to the various interrelationships of the pests concerned. Parasitic and predaceous insects, diseases and insectivorous birds are often of great value in holding destructive pests in check. Thus far, there has been little we can do to change these natural checks by artificially rearing and redistributing them.

Introduced Pests

THE control of introduced or foreign pests presents quite different problems. In the first place, every effort is made to prevent their introduction into this country through Federal laws and rigid quarantine inspections at all ports of entry. Pests that escape detection and become established in this country are contained by domestic quarantines to prevent their further spread. Furthermore, action is taken to exterminate them before they have become so firmly entrenched as to make such efforts impractical. If these efforts fail, a search is made in their native homeland for the specific parasites and predators that normally hold the pests in check there. These are introduced, and their establishment attempted in this country. Work of this type has been highly successful in controlling some foreign pests that have been introduced inadvertently.

(Turn to Page 112)

By W. V. Benedict

Division of Forest Pest Control USDA
Washington, D. C.



At left: Spraying pine trees infested with larvae of Black Hills bark beetles. The spray mixture kills the beetles under the bark.

Photos on facing page: Far Left—A typical stand of Douglas fir on Helena N. F. during an invasion of spruce budworms. Tree tops are losing their foliage and turning brown.

Right photo: Tanker unloading DDT mixture into 10,000 gallons storage tanks at Meeham air strip. Dispensing hose and meter in foreground.

All photos US Forest Service.



Vice chairman and chairman, respectively of the Fertilizer Industry Round Table, J. Reynolds, Davison Chemical Co., and Vincent Sauchelli, NPFL.

IN a meeting of some 300 fertilizer production plant superintendents, managers, foremen, etc., the various factors concerned with formulating, processing fertilizers, at minimum cost and maximum efficiency were discussed at the Fertilizer Industry Round Table, held November 5-7 at the Mayflower Hotel, Washington, D.C.

Organized originally by Dr. Vincent Sauchelli, now chairman of the Round Table, program and arrangements for the annual meeting were made by the Round Table executive committee, consisting of Dr. Sauchelli, Dr. H. L. Marshall of Olin Mathieson Chemical Corp.; Albert Spillman, Fertilizer Manufacturing Cooperative; and James Reynolds, Davison Chemical Co., all of Baltimore, Md.

The program included discussions on three phases of fertilizer manufacture: economics of formulation, economics of processing, and economics of preventive maintenance.

Economics of Formulation

FACTORS to be considered in preparing a formula which may contribute to cost savings and good operations were outlined by F. Nielsson, International Minerals & Chemical Corp., in opening the discussion on economics of formulation. He noted that the first two considerations are: (1) sales objectives . . . the physical form of the fertilizer which will satisfy the customer, i.e., powdered, granular, or semi-granular; and (2) what

type equipment is to be used,—for once the physical dimensions of the product are set, formulation is tailored to equipment.

"Each combination of product specifications and plant flow sheet sets a basic pattern as to what formulas are needed. For example, a conventional 5-10-10, generally has a lower raw material cost than granular or semi-granular 5-10-10. Granular 10-10-10 generally has a lower raw material cost than does the semi-granular or conventional product. A 10-10-10 formula for a continuous granular plant having only a cooler requires large quantities of free ammonia and sulfuric acid, and will be more expensive than one where a drier permits the use of large quantities of solution having a low free ammonia content."

Mr. Nielsson listed a number of points to be considered by a formulator in making up a new formula to ensure that the resultant product will yield the desired degree of customer satisfaction along with a fair return on investment to the manufacturer.

In selecting new raw materials, he pointed out that the formulator must consider net effect on cost . . . for example, although phosphoric acid is more expensive than triple super, by using the former it may be possible to eliminate sulfuric acid, use a greater amount of the low cost ordinary super, and replace solution with less expensive anhydrous ammonia. The net ef-

fect might be a sizeable saving in formula cost as compared with the more costly phosphoric acid.

The effect of the formula on the process is still another factor to be investigated,—for example, using 12 units of solution instead of 8 in a 12-12-12 grade should reduce the formula cost; however, the higher solution rate would probably require more recycle, and this in turn might dictate a decrease in tons per hour output.

Effect on physical condition of the product might show that a new formula, although offering an overall saving, yields a product which is undesirable. The cost of returned goods might offset the savings in formula cost.

Effects on chemical analysis, customer appeal, operating conditions, air pollution, degree of drying, storage problems, etc., were a few of the other other points touched on by Mr. Nielsson in his general review of the many considerations in changing formulation.

Usage and Cost of the Phosphates

A QUESTION on the formula, usage, cost and use-availability of diammonium phosphate, super phosphoric acid, phosphoric acid, calcium metaphosphate, and triple superphosphate, was answered by T. P. Hignett, Tennessee Valley Authority. Mr. Hignett outlined the conditions under which raw materials are available from TVA, which is at present the only source or a principal source of

FERTILIZER INDUSTRY ROUND TABLE

Meeting—in Review

PART I — To be concluded next month

three of the phosphate materials listed above. He indicated that a manufacturer might apply for a maximum of 200 tons of each of the new materials offered in a fiscal year, for test purposes.

In return, the manufacturer must agree to furnish TVA with a report of his experience on completion of the tests. Applicants for the new materials are approved, he said, when it appears that the planned use of the material will contribute to advancement of technology in producing high analysis, more economical, or otherwise improved mixtures. Minerals available under this program are: calcium metaphosphate, super phosphoric acid, diammonium phosphate, ammonium phosphate-nitrate (30-10-0), and high-analysis superphosphate (54% P_2O_5). The following are the current prices of the TVA materials for bulk shipment, f.o.b. Sheffield, Ala.

In further commenting on prices, Mr. Hignett reported on a

material	price
ordinary superphosphate	.90 to about 1.2/unit
triple superphosphate	.98/unit fob
wet process phosphoric acid (52-54%)	1.36/unit fob
furnace-grade acid	1.48-150/unit fob
DAP (21-53-0)	103/ton (bulk fob plant) in east
	125/ton in west
	75/ton

DAP, granular, made from wet process acid (18-46-0), offered by one producer in pilot plant quantities

on increasing the analysis of fertilizers," said Mr. Hignett, "that we may lose sight of the economics. There are cases in which increasing the analysis may not result in lower cost of fertilizer delivered to the farmer. This may be true when ordinary superphosphate is available at unusually low cost, and when higher analysis materials are relatively expensive."

Commenting on the advantages and disadvantages of formulation with phosphoric acid rather than triple superphosphate, Mr. Hignett observed that the advantages include: lower formulation

to those plants having dryers; and the high water content may cause difficulty in controlling granulation of high-nitrogen grades.

For use in solid fertilizers, Mr. Hignett observed that furnace acid has no important advantages over wet-process acid. It contains fewer impurities, and therefore gives less difficulty in handling. The choice between the two for use in solid fertilizers is generally based on economics. Furnace acid is used widely in manufacture of liquid mixed fertilizer; wet-process acid is not used for this purpose, because of impurities.

The principal interest in superphosphoric acid is for use in liquid mixed fertilizers. For this purpose, it has the advantage of increased solubility of the phosphates formed by ammoniation. This enables the manufacturer to make higher analysis liquid mixtures, or mixtures of lower salting

TABLE 1

material	per unit of available P_2O_5	price \$ per ton
concentrated superphosphate (54% P_2O_5) ROP	1.013	
calcium metaphosphate (64% P_2O_5) flat grades	1.033	
superphosphoric acid (76% P_2O_5)	1.473	
diammonium phosphate (21-53-0)		96.16
ammonium phosphate-nitrate (30-10-0)		58.00

check with commercial manufacturers for this information, and offered the summary in Table 2.

"Sometimes we become so intent

• Late in November, TVA announced that it has discontinued making fertilizer containing 48% plant nutrients, but would manufacture high analysis superphosphates.

costs, less fuming and better nitrogen recovery, the possibility of higher analysis grades, and improved granulation with some grades. On the other hand, disadvantages include equipment cost of handling and metering acid; the high water content restricts use

Left photo: H. L. Moore, Moore's Lime and Traverse Hignett, TVA.

Center: D. C. Kieffer, Smith Douglass Co.; W. E. Schaffnit, Stedman Foundry & Machine Co.; A. Spillman, Fertilizer Manufacturing Coop.; F. A. Retzke, Smith Douglass Co.; W. J. Tucker, Grange League Federation; and H. R. Krueger, Stedman Foundry & Machine Co.

Right photo: J. Prosser, A. J. Sackett & Sons; H. L. Marshall, Olin Mathieson Chemical Corp.; and S. Eckers, Bemis Bag Co.





out temperature. There is also considerable interest in using a combination of superphosphoric acid and wet-process acid in making liquid fertilizers. The pyrophosphate content of the superphosphoric acid sequesters the impurities in wet-process acid, so that they do not precipitate on ammoniation. The proportion of superphosphoric acid required ranges from 10 to 50 per cent (P_2O_5 basis), depending on characteristics of the wet process acid, and grade of desired product. Thus, use of superphosphoric acid may open up new markets for wet-process acid in the liquid fertilizer field.

Calcium metaphosphate is used in granulation processes principally in low nitrogen or non-nitrogen grades. The main advantages of calcium metaphosphate for use in mixed fertilizers are its high concentration and its ability to improve granulation of some grades.

Diammonium phosphate is used in formulations for granular and non-granular mixed fertilizers,

in dry blends, liquid mixtures, and for direct application. Its delivered cost is usually somewhat higher than an equivalent amount of wet-process phosphoric acid and ammonia. However, it has some advantages that often offset the higher cost.

Mr. Hignett concluded his discussion of the phosphates with the observation that most of the companies he checked with indicated that the supply of triple superphosphate and phosphoric acid is fully adequate to meet the present demand. Some producers reported that availability of tank cars is a bottleneck in supplying wet-process acid. Diammonium phosphate is not widely available because there are few producers. Superphosphoric acid is not readily available due to lack of a rail freight rate. Some commercial sources indicated that they could supply it, but no prices were given. It is understood, he said, that superphosphoric acid is available to fertilizer manufacturers in Canada, and that a satisfactory rail freight rate is applicable.

It was pointed out that 54% triple superphosphate readily picks up moisture, because it consists of anhydrous mono calcium phosphate. The absorbed water does not make the material sticky,—but it does increase the weight and decrease the grade of the product. In using triple super, the consumer should keep this property in mind, and take it into account in making up a formulation. Mr. Hignett observed that another factor to consider in using super phosphoric acid, in connection with its affinity for water, is that after absorbing 1 or 2% water, the freezing point will be raised, and the material will start to crystallize.

Minimum Nutrient Content

IN a discussion of factors that establish whether a formula is low or high analysis, W. L. Hill, USDA, Beltsville, Md., noted that one school considers "the top of the low-analysis category as the

maximal grade that is producible without fortification with a higher-grade phosphorus carrier,—about 30% of $(N P_2O_5 K_2O)$. Mr. Hill also pointed out, however, that on a regional basis, grades vary considerably. What may be a relatively high-analysis fertilizer in one state turns out to be a relatively low analysis product in some other state. At the same time, the grade may meet soil needs under the dominant management practice in the first area more adequately than would the high analysis product marketed in the second. "Hence, the manufacturer serving the first area properly resents the mild stigma associated with dubbing his best product a low-analysis fertilizer. And, regional differences in market demands, rather than cussedness of vendors, is the chief obstacle to uniform usage of current terminology."

What is the maximum ammoniation rate using anhydrous ammonia and the several phosphate materials? (phosphoric acid, triple, single)

IN answering this question, T. E. Martin, U.S. Industrial Chemicals Co., listed the following as widely used practical ammoniation rates.

triple	4 lbs/unit APA
super	6 lbs/unit APA
H_3PO_4	7 lbs/unit APA

These are not maximum rates, he said, in that these rates can usually be attained without appreciable loss of ammonia, provided the ammonia is fed subsurface in suitable mixing equipment. They may be regarded as maximum practical rates, at least at present. The rate for phosphoric acid, he said, can be run up to $7\frac{1}{2}$ lbs/unit APA, with reasonably careful operation, without appreciable ammonia loss.

Obtaining maximum ammoniation depends on allowing adequate time for attainment of equilibrium,—but practically, there is a definite limit on the reaction time. The physical condition (porosity, state of fineness, moisture

(Continued on Page 105)

Photo Captions

1. Harwood, F. Nielsson, both of International Minerals and Chemical Corp.; P. F. Stocker, Land O'Lakes; G. W. Kramer and D. J. Smalter, also of IMC.
2. P. T. Waters, S. E. Shelby, J. R. Suber, T. J. Bosman and J. H. Lansford, all of Federal Chemical Co.
3. L. L. Jaquir, Phillips Petroleum Co.; M. Rowe, Ashcraft Wilkinson Co.; and R. Alstetter, NPFI.
4. L. F. Cizek, and Rodger Smith, Eastern States Farmers Exchange; H. R. Tucker, Sohio Chemical Co.
5. W. Porterfield and S. Rogers, National Potash Co.; F. Kennedy, Potash Co. of America, and E. Horne, Bradley and Baker.
6. W. A. Cairns, Consolidated Mining Co.; A. Slack, TVA; J. B. Thompson, Consolidated Mining, and V. Sauchelli, NPFI.
7. L. Byck, U. S. Industrial Chemical Co.; R. L. Olmsted and D. C. Washburn, both of Northwest Coop Mills; and C. Everhart, U.S.I.
8. E. Perrine, Nitrogen Division; W. Jacobi, Union Bag Camp Paper Corp.; and R. D. Tayloe, National Potash Co.
9. R. A. Gurd, Farm Bureau Coop, George Urbanks, IMC, and J. Stark, GLF.
10. E. Valliant, Valliant Farmers, Inc.; J. Spillman, American Cyanamid Co.; F. Nekirk, Central Chemical Co.; and D. O. Conrad, Eastern States Farmers Exchange.

WITH no great fanfare,—the pesticide industry has continued its search for new and better pesticides. . . . and introduced quite a few new chemicals over the past year. Some of the products have already been thoroughly field tested and were offered commercially in 1958. Others will be available only in limited quantities during 1959 for further test work.

This article comments on the status of the new pesticides, and reviews a new approach to pest control, the microbial pathogen, *Bacillus thuringiensis*.

for millions of dollars in crop losses each year.

An effective microbial pesticide would have the following major advantages over present organic chemical insecticides: (1) it would be harmless to all forms of life other than insects; (2) would not leave residues harmful for either human or animal consumption; (3) would not harm the crops themselves; (4) would not mutate, or change into organisms pathogenic for man, livestock, or plants; (5) would be specific only for damaging pests, and not directly harmful to such beneficial in-

barley, rye and seedling blight or seed decay of flax. The material is also used as a dip for gladiolus corms to control scab, *Fusarium* and *Curvularia*.

The uses must be restricted to those where treated plant parts are not used for human or animal food. (Skull and Crossbones are required on the label.) Other possible uses are for pecan scab, anthracnose of cucumbers and watermelons, turf fungicide, slime control and as a leather fungicide.

Emmi is readily soluble at room temperature at concentrations of 10 per cent or more in acetone, methyl isobutyl ketone, isophorone and other ketonic solvents, moderately soluble in alcohols, slightly soluble in hydrocarbons and substantially insoluble in water. It is stable under a variety of conditions, and adequately resistant to heat, light, moisture, and air for agricultural use.

Aqueous solutions have been reported to be corrosive to some metals which form amalgams with mercury. To avoid corrosion, equipment should be cleaned with a strong detergent and hot water after Emmi aqueous solutions are used.

Extreme caution is recommended in handling this material due to the poisonous qualities inherent in organic mercurial compounds. Oral LD₅₀ rats (estimated) 148 mg/kg.

Emmi in concentrate form may burn skin, and exposed areas should be washed immediately with soap and water. Mercury burns respond to Gentian Violet.

Emmi emulsifiable concentrate should be packed in glass or high baked phenolic lined drums.

Ozoban for Control of Smog Damage

A NEW plant spray, Ozoban, recently found to sharply reduce crop losses from smog, is now being made available commercially in California by Chas. Pfizer & Co., Inc.

Reported highly effective in University of California trials on vegetable crops and flowers, the

New PESTICIDES for 1959

Part I of a review of such new commercial pesticides as:
Ozoban, Invertron, Tryben, Mylone, Emmi, Trolene,
Glyodin, Dibrom, Phaltan, Sytam, Dowicide A,
Herbisan A, Terraclor, Phosphamidon,
Korlan, Cyprex, Kelthane, and
Navadel.

Microbial Pesticide—A New Approach

WIDESPREAD research and product development has been underway for some time on a microbial insecticide which gives promise of a new and more significantly effective means of insect control, officials of Merck & Co., Rahway, N. J. announced last month.

Merck has distributed working samples to 19 agricultural colleges and universities throughout the nation, according to Dr. John D. Garber, manager of agricultural and organic chemical development. In its research and development, Merck is employing advanced microbiological techniques, coupled with fermentation processes now in use for other products in the agricultural chemicals field.

Key to this new approach for insect control is represented by the microbial pathogen, *Bacillus thuringiensis*, which is capable of destroying insects that are responsible

sects as bees, insect parasites, and predators, and (6) there are no known cases of insect resistance build-up to microbial organisms.

Present developments indicate this new microbial insect control material may be incorporated into dust or liquid sprays that can be dispensed from conventional equipment now in use.

Merck plans large scale field demonstration trials for its new microbial insecticide in 1959.

New Mercurial For Smut Control

EMMI is one of the mercurials that is used as an eradicator and protectant. The chemical name is N-ethylmercuri-1,2,3,6-tetrahydro-3,6-endomethano-3,4,5,6,7,7-hexachlorophthalimide. The formulated material will be an Emmi 10% emulsifiable concentrate. The compound is made by Velsicol Chemical Corp., Chicago.

Emmi label registration is for the control of smut on wheat, oats,

new formulation is expected to have important application in Southern California where losses to smog are very heavy.

Recommendations for commercial use of the new chemical spray are being made in line with research results obtained in Experiment Station studies at Riverside, California. A concentration of two pounds of Ozoban per 100 gallons of water offered adequate protection, with no damaging effects, on treated pinto beans, romaine lettuce and petunias in these trials. Five sprayings a week over a five-week period were used in this work which was conducted by Dr. Hugh T. Freebairn and Jackson Davidson.

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Invert Controls Spray Drift

INVERTON 245 is an invert emulsion formulation containing 2, 4, 5-trichlorophenoxyacetic acid developed by The Dow Chemical Company, Midland Mich., designed to cut the spray drift hazard to a minimum.

The new product promises effective weed and brush control on transmission and distribution right of ways. The invert emulsion is a dispersion of oil particles in water—the reverse of a standard emulsion. This gives the spray mixture a thick, creamy consistency which causes it to cling to branches and foliage. This characteristic "cling" permits spray crews to work in wet weather when conventional herbicides cannot be used. During 1957 trials, good brush control resulted from spray applications made just before, after, and even during rain showers.

Inverton 245 is sprayed on vegetation in large particles and does not break into a mist. This cuts to a new low the possibility of damage from spray drift. In addition, the product is a non-volatile, free acid formulation which limits possibility of vapors causing damage on adjacent land.

Standard spray equipment may be used to apply Inverton 245. It can be used as a leaf-stem

spray, and promises to be effective as a broadcast basal application.

There are indications that Inverton 245 can be used over a longer spray season than conventional herbicides. Good top kills have resulted from applications made during virtually all seasons of the year. However, the potential for extending the spray season cannot be fully evaluated until current trials are completed.

Proper mixing is one of the primary keys to successful use of the invert emulsion spray. A practical mixture is 1½ gallons of Inverton 245, 15 gallons of oil and 83½ gallons of water. The oil and chemical are mixed and added to the tank. The water is then added slowly, accompanied by various agitation.

Various methods of application may be used. Coarse splash-type or gravel washing nozzles have been effective, as have conventional orchard spray guns such as the Bean Spray-Master DeLuxe with a No. 10 or 12 disc. The method depends on the job to be done and personal preference. However, spray pressures should not exceed 200 psi and a 50-foot hose pumping length seems most effective. A 100-foot length is the maximum. Aerial application also seems to offer great possibilities. In aerial application, drift control is a real problem with conventional formulations. It has been demonstrated that invert emulsions can be applied successfully by airplane, and that they do provide uniform, well-contained spray patterns. Conventional nozzles and the rotary brush applicator have been used satisfactorily.

Inverton 245 is available through normal outlets for farm weed and brush killers.

Mylone for Weeds and Soil Pests

MYLONE Soil Fumigant is a new Crag agricultural chemical sold in formulation grade to formulators by Union Carbide Chemicals Co., New York. The active ingredient of this basic material is 3,5-dimethyl tetrahydro-1,

3,5,2H-thiadiazine-2-thione. It is suggested for use as an active ingredient in soil fumigant formulations for preplanting control of certain weeds, nematodes, and soil fungi. It can be used in formulations for treatment of tobacco plant beds, vegetable seed beds, forest tree seed beds, ornamental propagating beds, turf, gladiolus (Florida only), and citrus replanting (California only). No plastic cover is required. The formulations are applied to the soil, and then soaked into the ground.

Mylone is not a poison by any of the accepted definitions. The single oral dose LD₅₀ of this material to rats is .5 gm/kg of body weight. Tests indicate that it is not readily absorbed through the skin, and is not a primary skin irritant. Furthermore, there are no detectable residues of recommended Mylone formulations or their breakdown products when application is made in accordance with label directions.

No special handling precautions or protective clothing are required. As with any pesticide product, however, handling should be in accordance with label instructions. Precautions and practices that are usual in the handling of economic poisons should be observed.

Users should be warned, however, that Mylone is toxic to all growing plants, and should not be used within three to four feet of growing plants. Vapors from soil treated with Mylone in greenhouses and cold frames may injure growing plants. Since residue data and long-term toxicological data are not yet available, Mylone should not be used in propagating beds for food or feed crops.

Regarding general formulation practices, organic diluents (such as wheat bran, tobacco stems, buckwheat hulls, corn cob dust or walnut shell dust) are recommended for Mylone. Mylone dusts prepared with substantial percentages of inorganic diluents are not satisfactory. Test formulations con-

taining 50% Mylone and prepared with carriers from the various classes of inorganic diluents, all showed some degradation of the active ingredient on storage.

No acceptable, economical emulsifiable concentrates containing Mylone have been developed.

Tryben 200 Controls Bindweed

TRYBEN 200 weed killer is based on the dimethylamine salt of trichlorobenzoic acid, plus dimethylamine salts of other polychlorobenzoic acids, and contains two pounds of trichlorobenzoic acid equivalent per gallon. It was made available commercially through distributors and dealers in the spring of 1958. It is manufactured by E. I. du Pont de Nemours & Co., Wilmington, Del.

It is particularly recommended for control of bindweed, Canada thistle, trumpet vine, and many other tough broad-leaved perennials. It is considered to be the first really effective control for certain broad-leaved deep-rooted perennials and woody vines. The herbicide is non-selective, and is formulated as a liquid to be diluted with water for spray application. Total spray volume needed per acre depends on the density and height of growth to be treated.

To kill established stands of deep-rooted perennials, dosages of five to 10 gallons of Tryben weed killer per acre are recommended. This range of dosage is effective against such species as field bindweed, leafy spurge, Canada thistle, Russian knapweed, bur ragweed, and woody vines, such as trumpet vine, honeysuckle and smilax. Higher dosages (10 to 15 gallons per acre) will provide residual effects to prevent establishment of new seedlings, giving control of most perennial and annual broad-leaf weeds for one year or longer.

Rates as low as two gallons of Tryben 200 in 100 gallons of water have been found to be effective against certain species of woody brush, including conifers,

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Dibrom—An Organic Phosphate

KKNOWN formerly as RE 4355, Dibrom, a phosphate-type insecticide is designed for dilute or concentrate applications for control of various insect pests. Chemically, the material is 0,0-dimethyl-0 - (1,2-dibromo-2,2-dichloroethyl) phosphate. It is offered in limited quantities and on a limited basis by California Spray Chemical Corp., Richmond, Calif.

Dibrom has been tested against *Drosophila*, mosquitoes, Colorado potato beetles, fleabeetles, grasshoppers, springtails, chicken lice and mites, cabbage worms, Japanese beetle, housefly, European red mite, 2-spotted mite, leaf miners, various aphids, leafhoppers and many foliage feeding larvae. It exhibited a high rate of efficiency as a contact insecticide and stomach poison, and a limited amount of vapor toxicity. Greatest activity is a result of contact action. Residual activity is relatively short.

The optimum effective dosage for any insect pest has not been established. Effective control of the insects on which tests have been conducted has indicated that a dosage of $\frac{1}{2}$ to 1 pint Dibrom 8 Emulsive per 100 gallons water, or 40 to 50 lbs. per acre of the 4% dust would be indicated as a preliminary dosage. It is suggested that higher and lower dosages be tried experimentally.

The acute oral LD₅₀ on rats is 430 mg/kg; the acute dermal LD₅₀ on rats is 110 mg/kg. In sub-acute feeding studies, 30 ppm Dib-

rom in the diet of rats fed 27 days showed no histologic, anatomic, or toxic effects.

As a new product, regular organic phosphate precautions should be taken when handling or applying formulations of Dibrom. Dibrom may be absorbed through the skin, inhaled or ingested orally to produce toxic symptoms. It may be irritating to the eyes and nasal passages, especially in the dust form. Atropine is antidotal.

Formulations available in the east and west are an emulsifiable concentrate,—eight pounds active per gallon. In the west only, a four per cent dust is available.

Delnav—Miticide For '59

DELNAV* is Hercules Powder Co. trade name for the miticide-insecticide described chemically as 2,3-p-dioxanedithiol-S,S-bis (O,O-diethyl phosphorodithioate) and related compounds. This promising new material has been granted label approval for the control of mites on cotton, citrus, dried beans, seed alfalfa, seed clover, walnuts, grapes, apples, pears, peaches, cherries, prunes, plums, apricots, and ornamentals. Species of mites controlled with Delnav include 2-spotted mite, European red mite, citrus red mite, 6-spotted mite, yuma mite, rust mite, purple mite, Texas citrus mite, clover mite, spruce spider mites. Delnav has proved effective against many species of insects, and has been registered for control of grape leafhoppers on grapes. At present, the registered uses for Delnav on food crops have been granted on a no-residue basis. However, it is anticipated that tolerances will be granted for Delnav on certain crops before the 1959 season, so that Delnav may be used closer to harvest and for additional applications.

Delnav has also proved to be effective against many external pests of livestock. It has been granted label approval for control of brown dog ticks when applied

In January, *Agricultural Chemicals* will continue with Part 2 of this series, reviewing the new pesticides. Parts 2 and 3 will include discussions on Phaltan, Terachlor, Korlan, Cyprax, Sytam, Kelthane, Trolene, Herbisan A, Phosphamidon, Tedion, HCA, Trithion, Systox, Simazine, Guthion, Ethion, Thimet, Dyrene, Phostex, Sevin, Thiodan, DEF, Eptam, and several experimental pesticides, not yet trademarked.

*Delnav is the new name for Hercules 528, which was briefly named "Navadel."
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J. J. Mauget holds leaves from chlorotic avocado trees. Specimen at left is from an untreated tree, specimen at right from a tree which had been "injected" a month earlier.

Injection Plant Feeding

By J. J. Mauget

Mauget Company,
Los Angeles, Calif.



INJECTION or "hypodermic" techniques, where-by plants are fertilized by fluids entering their xylem ducts, date back at least 3000 years—the great Leonardo da Vinci having, among other things, been one of the first to recognize their potentialities. However, complicated tools and methods were until recently factors that limited the injection concept to the realm of agricultural experimentation.

Injection tools, whose applicational potentialities are indicated by accompanying photographs, have simplified injection procedures to the point where they can be satisfactorily employed by commercial growers—and, in some instances, even by conscientious amateur gardeners. But, due to the growing number of agrichemicals with hypodermic potentialities, it seems safe to say that the injection process is still in its infancy.

For example, we now feel that injectants for the control of insects and various plant diseases will

eventually have far more practical applications than injections for the correction of nutritional deficiencies (which are used most widely at present). Reason is that hypodermics for either plants or humans should, as a matter of general practice, be used only in cases of emergency.

No matter how easily they may be injected, plant foods are always going to give the best long-term results for the least money if applied to soil. Therefore, as more growers make proper use of fertilizers in a conventional manner, the need for injection feeding

should progressively diminish, because few plants should reach a point where they require such treatment.

On the other hand, there is an excellent possibility that plants (like healthy humans and animals) can be immunized against various ills with non-nutritious injections.

At this writing, for instance, tests have already shown that systemic insecticides can make certain plants impervious to various types of bugs—much the same as they make dogs and cattle repulsive to fleas and ticks.

Similarly, excellent results have been obtained experimentally using gibberellic acid to overcome the virus responsible for stunted growth in several different types of fruit trees.

From a strictly practical viewpoint, injections are now most important for the control of chlorosis—especially in orchards, due to the high cost of replacing productive fruit trees. Chlorosis is basi-

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Inserting a "hypodermic" tube in a plant: Tool with metal tube on its probe is pressed into a limb or trunk. If work were being done with a larger tool on a tree, probe and tube would be hammered in like a nail. (2) Tool is withdrawn, leaving tube firmly seated. (3) Gravity feeder cup, made from plastic and having rubber seal around hole in bottom, is mounted on the injection tube. (4) Pill containing plant nutrient is dropped into the gravity feeder cup, which now contains distilled water. Tap water might be used, but minerals therein could hurt the plant.



ONE of the biggest jobs the pesticide industry has is educating the man who reads the label on an insecticide to follow the directions when using or storing it, according to Justus C. Ward, head of the Pesticide Regulation Section, Agricultural Research Service, USDA, who spoke at the annual meeting of the Carolinas-Virginia Pesticide Formulators Association in Pinehurst, N. C., Nov. 18, 19, and 20.

Mr. Ward said that usually it is careless storage that is the cause of a child's getting poisoned. In his address, in which he traced the development of regulatory controls, Mr. Ward pointed out that a large portion of the difficulty in enforcing labeling regulations comes from the practice of shipping bulk materials for re-packing by distributors. Quite often, he said, when an inspector samples products on dealers' shelves, they are not what they ought to be. He blamed faulty measurements or the use of improper diluents for the discrepancies. He said, also, that adulteration occurs in some formulations in which not all chemicals are stable. To remedy this situation, Mr. Ward recommended that storage tests be carried out on any new product so that the manufacturer can be sure it will retain its formulation over a given period of time.

Since the adoption of the Miller Bill, Mr. Ward said, 97 chemicals have received tolerances or exemption from the need for tolerances. He said that 2,194 uses for chemicals have been considered.

Dr. C. J. Nusbaum, Department of Pathology, North Carolina State College, Raleigh, reviewed developments in nematode control during the recent past. He said that the adoption of soil fumigants is one of the really important developments in pest control. One of the first instances of the use of fumigants on a large scale was on tobacco in the east.

In 1951 and 1953 climatic conditions were favorable to nema-

Nematocide Developments and Changing Insecticide Picture - Highlight Discussions at Annual C-VPFA Meeting

todes in that area and nematocides really caught on in those years because the tobacco in fumigated fields was spectacularly superior to non-fumigated crops. In 1950, he said, 1,000 acres were treated and in 1954 the total treated acreage was 150,000. The use of soil fumigants reached a peak in 1956. 1958, Dr. Nusbaum pointed out, was a terrible season for fumigation because of the late spring which delayed nematode activity in the soil until it was too late to fumigate effectively. He said that this sort of season could contribute to some adverse feelings about nematocides on the part of growers who fumigated.

Dr. Nusbaum said that nematode problems in tobacco are still with us but they are not widespread as previously. Most growers now regard soil fumigation as a standard practice and will continue to use it, he said. He warned, however, that they need to be advised about the proper use of nematocides so as not to injure crops. The outlook for soil treatment of tobacco, he said, is not too bright because of acreage cuts and surpluses. New opportunities for soil fumigants will open up, however, on other crops, he concluded.

Highly profitable returns and increased yields were reported from cotton areas where "Gibrel" is included in cultivation practices by Dr. James M. Merritt, manager of the plant products development department of Merck & Co., Rahway, N. J. Response in heavier loading, with higher counts of squares, flowers, and bolls throughout the fruiting season were reported.

Dr. Merritt also told the meeting that the use of Gibrel on citrus has doubled fruit set on navel oranges, and juice has been increased nine per cent, ascorbic acid

13 per cent. He said that Merck's brand of gibberellic acid sprays also produce bigger grapes.

Prospects for the future role of "Gibrel" in agriculture are promising, Dr. Merritt advised. "Celery crops benefit; seed potato dips break dormancy and induce maximum stands that often improve yields; and ornamental plant growth can be controlled through combination treatments with Gibrel and a growth inhibitor. Dr. Merritt said that application of Gibrel to tomato plants through the soil increases the size of the plants but does not result in undesirable elongation. It is placed with fertilizer in these tests, he said.

Dr. S. H. Benedict, Shell Chemical Corp., New York, reported on nematodes and said that it took 25 years of scientific detective work to expose the nematode as the cause of spreading decline in citrus trees in Florida. He said that suspicion for years was aimed at various soil insects, rots, and fungi. In closing, Dr. Benedict announced that Shell has developed an emulsible formulation of "Nemagon" that can be applied with liquid fertilizers.

A report on the 1958 cotton insect control program was presented by L. M. Sparks Jr., extension entomologist, Clemson College, Clemson, S. C., who said that the cold winter and wet spring in 1958 dissuaded some farmers from spraying for boll weevils in spite of recommendations for early season control to prevent late season build up.

In June, Mr. Sparks said, thrips and boll worms were active in 15 per cent of untreated fields and, by July 1, the insect situation was as bad as it ever has been. By this time, about one half of the

cotton acreage in South Carolina had been sprayed, with heavy rains affecting the timing and causing some applications to be missed entirely. First-generation weevils appeared in mid-July, he said, and some areas reported 100 per cent weevil infestation by August.

Had we been able to convince the grower that continued spraying would prove profitable even in years that loomed as low weevil years, he said, there could have been a very good cotton crop in South Carolina. In areas where control recommendations were carried out, Mr. Sparks noted, the cotton was of very high quality. In concluding, he said that one reason for the wider use of pesticides today is that experiment stations and industry representatives are telling the same story to the farmers. This tends to build up the farmer's confidence in what he is told.

S. A. Hall, director of the Pesticide Chemicals Research Laboratories, USDA, Beltsville, Md., presented a highly illuminating report on the changing insecticide picture in which he showed a series of colored slides illustrating the various classes of pesticides. He said that the requirements for a pesticide are changing. For example, he pointed out that insecticides are now being sought which do not have exceptional residual activity. Insecticides have to change to meet situations, he reminded, listing resistance and residues as major current problems.

The main aim now, Mr. Hall said, is for the development of a highly specific insecticide that is relatively harmless to warm-blooded animals and is free of residue problems.

L. H. Fountain, a member of the House of Representatives from the Second District of North Carolina, spoke on pesticide and farm problems in Washington. He said that Congress has been aware of problems of pesticide toxicity to wild-life and that more information is needed on the subject.

The annual Outlook Conference of the Department of Agriculture is going on in Washington now in an attempt to appraise the coming 1959 situation.

Speaking of farm surpluses, Mr. Fountain said that pesticide people are in part responsible. He also mentioned the fertilizer industry, better machinery, and the work of the experiment stations. Cotton growers, he reminded, will be permitted next year to increase their acreage by 40 per cent. This could lead to an uncomfortable cotton surplus. In addition, he said, something like 80 million acres of corn will be planted in 1959 resulting in a crop of about four billion bushels. Mr. Fountain warned that this will probably contribute 500 million bushels to already existing surpluses.

Returning to the problem of residues, Mr. Fountain predicted that the pesticide industry has a great future ahead if "we can get the work done to insure society the safety it must have. Results of the farm revolution, he concluded, may prove to be as far reaching as those of the industrial revolution.

The commissioner of the Virginia Department of Agriculture and Immigration, Parke C. Brinckley, was the final speaker on the meeting's program, observing that agriculture has changed its appearance a whole lot in the past 100

years but has lost none of its importance. Thirty-seven per cent of all jobs in the nation today are connected with the broad field of agriculture, he said, and 40 per cent of the gross national product is in agriculture.

Touching on soil banks and acreage controls, Mr. Brinckley said that our first consideration must be the welfare of the farmer, who must remain aggressive and progressive. What we need is not restricted production, he continued, but rather a bigger market. Food is cheaper today in terms of wages per hour than at any time in history, he reminded, and this has been brought about in part by the pesticide, fertilizer, and farm machinery industries.

To solve the problem of surpluses, Mr. Brinckley called for a closer relationship among all factors of agriculture.

Frank Reid, Quality Chemical Co., Wilson, N. C., was elected president of the Carolinas-Virginia Pesticide Formulators Association for 1959. Kenneth Blanchard was named first vice president and John Thompson was elected second vice president. Hugh Horn, Howerton Gowen Co., Roanoke Rapids, N. C., was re-elected secretary-treasurer for 1959. George Simches, Planters Chemical Corp., Norfolk, Va., the out-going president, presided over this year's meeting.★★

Shown at the C-VPFA meeting are: George Simches, (left) of Planters Chemical Corp., Norfolk, outgoing president of the organization; Frank Reid, (center) Quality Chemical Co., Wilson, N. C., elected president for 1959; and Hugh Horn, Howerton Gowen Co., Roanoke Rapids, N. C., reelected secretary-treasurer.



A LENGTHY list of new agricultural chemicals which are expected to find increasing commercial use was reviewed at a meeting of the Commercial Chemical Development Association and the National Agricultural Chemicals Association held November 20th at the Lord Baltimore Hotel, Baltimore, Md. The meeting scene shifted on November 21st to the Agricultural Research Center, USDA, at Beltsville, Md. where several leading scientists from ARS participated in reviewing research with plant regulators and antibiotics, nematocides, insect attractants and repellents.

In the discussion dealing with new pesticides and growth regulators, several of the compounds described are taken up in detail in the current *Agricultural Chemicals* (see pages 34-36). To avoid repetition, only brief mention will be made of these products in this report of the NAC-CCDA meeting (some 15 of the new chemicals will be reviewed in the next two issues of *Agricultural Chemicals* to conclude our series on the new pesticides).

Defining the plant growth regulator as a chemical which has a determinable effect on any of the many different phases of plant growth, other than causing only tissue necrosis,—Richard Wellman, Union Carbide Chemicals Co., reviewed the history of the growth regulator field, thru the recent appearance of gibberellin in the picture,—and commented on the continued search for other growth hormones.

"Rohm & Haas reports a new growth regulator, sodium a,b-dichloroisobutyrate, which has the unique property at proper concentrations, of killing only pollen," stated Dr. Wellman. "Using this new growth regulator, hybridization can easily be accomplished by spraying the flowers of the female parent."

Two other interesting growth regulators are 2-isopropyl-4-dime-

New Chemicals for Agriculture

theme of NAC and CCDA meeting

thylamino-5-methylphenyl-1-piperidine carboxylate methyl chloride (amo-1618) and indole methane sulfonic acid. These are effective dwarfing agents for plants. In the defoliant field, DEF appears to be a tool in furthering the use of mechanical harvesting in cotton. Workers at Boyce Thompson Institute report the isolation of a hormone from Maryland Mammoth Tobacco, which has been shown to have growth promoting activities different from gibberellin. The studies, said Dr. Wellman, are still in a very early stage of development.

Replying to a question on what may be the current volume of the growth regulators, Dr. Wellman ventured an estimate of some twenty million dollars at the manufacturers' level.

Herbicide Developments

K EITH C. Barrons, of Dow Chemical Co., observed that many herbicides have growth regulator activity,—and defined the herbicide, as a chemical which kills or controls growth of an unwanted plant. He classified herbicides into several general groups: the herbicidal oils; inorganic and organic arsenicals; the borates; the chlorates; substituted phenols; halo-aryl-oxy compounds; chloro aliphatic acids; carbamates and thiocarbamates; substituted ureas; acetamides; heterocyclic nitrogen compounds; organic mercuries; chlorobenzoic acids; and substituted phthalamic acids.

Probably the most important of the herbicides, said Mr. Barrons,

are the halo-aryl-oxy compounds, including such materials as 4-(2,4-dichloro phenoxy) butyric acid and 4-(2-methyl-4-chlorophenoxy) butyric acid. These last two materials are being used commercially in England, employing their selective action on certain crops. Alpha chloro N-N-diallyl acetamide has been approved recently for an expanded list of crops,—and considerable interest has been expressed in the carbamates for selective control of weeds in a range of crops.

The most spectacular of the new herbicides in recent years, remarked Mr. Barrons, among the heterocyclic nitrogen compounds has been 3-amino-1,2,4-triazole, which has found a place in control of Canada thistle, poison ivy, and other weeds. Then, in addition to the first commercial triazine herbicides, 2-chloro-4,6-bis (ethyl amino) -s-triazine,—several other triazine compounds show very promising selectivity. The future, concluded Mr. Barrons, will lie in a wider list of compounds with specific activity.

New Insecticides

I NSECTICIDE chemicals involved in recent major development were discussed by George Ferguson, Geigy Agricultural Chemicals. He commented on the continued introduction of systemic insecticides—such as Systox and Thimet (first of the systemics to be used as a seed treatment); the introduction of Trolene and Co-Ral as animal systemics; the new markets for organic phosphates, for example the use of Diazinon,

Dicaphon and Korlan for roach control—and recent label acceptance for use of Diazinon as a dog dip

Considerable development work has been done on use of Diazinon, Guthion and Trithion for control of codling moth and other fruit pests on apples. Phosphates such as Diazinon, VC 13 and Trithion are used commercially for control of the Lawn Chinch Bug. Because of tolerance limitations now prevailing, renewed interest is expressed in TEPP and Phosdrin for use close to harvest. Other phosphates now undergoing field evaluation are DDVP, Delnav, Ethion, and others under various code numbers. Some organic phosphates, such as Phencapton, Meta-Systox, Disystone and Ammidone, have been introduced to the European market and are undergoing field evaluation in the United States.

Outside of the organic phosphate field, the most significant new developments concern the carbamates, which like the organic phosphates, have anti-cholinesterase activity and vary in mammalian toxicity on about as broad a range as do the organic phosphates.

Three carbamates—Isolan, Pyrolan, and Dimethan have been on the market in Europe for the past few years, but have not been introduced into the United States. A closely related compound, Geigy Dimetilan, is now undergoing field testing for the control of flies resistant to both chlorinated insecticides and organic phosphates. Another carbamate, Sevin, is at an advanced stage of development and was introduced to the market in 1958 with a temporary tolerance. Large scale commercial introduction is reported to be planned for 1959.

A few additional compounds should be noted. Thiodan has been reported to give excellent results as an aphicide. Tedion and Chlorbenside are being introduced as miticides. A new synthetic pyrethrin derivative — Barthrin — is now undergoing tests and Sesoxane is

being evaluated as a pyrethrin synergist.

As to end-use formulations, there has been a trend in recent years away from dusts and toward increased use of emulsifiable formulations. This trend has been accelerated during the past couple of years and it is, of course, important to the suppliers of emulsifiers, especially the non-ionics, and solvents, such as xylene and light petroleum distillates. This trend has been especially marked on such large acreage crops as cotton. Changes in application methods and formulations in these large tonnage markets vitally affect the raw material suppliers to our industry as well as our industry itself.

Fungicide Developments

SEVERAL interesting new fungicides have been offered for development in the recent past, stated E. M. Swisher, Rohm & Haas Co., as he followed with the discussion of such new fungicides as Dyrene, Maneb, Terrachlor, and some of the others. "Cyprex," he reported, "is a foliar fungicide developed by American Cyanamid Co., but not yet commercially available. It is promising for control of apple scab, and will compete directly with Captan and Glyodin."

Thioneb shows promise for use on fruits and vegetables, but has not yet cleared for commercial uses. Karathane,—developed originally as a miticide, has been found to be highly specific for control of powdery mildew fungi. An experimental fungicide developed by Rohm & Haas, 03818B, has proved to be highly effective for control of cereal rust. Another experimental product is a soil fungicide offered by Chemagro Corp. under the name Bayer 22555, which appears to have special merit as a seed treatment chemical on sugar beets, peas and beans, and is also effective for some uses as a soil fungicide.

Mr. Swisher concluded his review with some remarks on the antibiotics which have been found

effective for control of certain bacterial and even some fungal diseases of plants.

At the USDA research center in Beltsville, Secretary of Agriculture, Ezra Benson addressed the group, discussing the importance of research in today's agricultural economy,—and commented on the keen interest shown by the chemical industry in improving agricultural practices through the use of pesticide chemicals to aid in increasing production of food and fiber crops.

Dr. H. L. Haller presided at the Beltsville sessions, introducing such speakers as John W. Mitchell, ARS, who reviewed current research with plant regulators and antibiotics; S. A. Hall, ARS, who discussed insect attractants and repellents; W. C. Shaw, who reported on new uses for old and new herbicides; and C. S. Slater, ARS, who commenting on soil conditioners, discussed the effects of these chemical compounds on the soil and on plant growth.

The Nematocide Market

NEMATOCIDES used in large quantities are dichloro propene and ethylene dibromide, 1,2 dibromo - 3 - chloro propane, observed A. L. Taylor, USDA, in a review of progress in development of nematocides. The above products are called field nematocides to distinguish from the seed bed nematocides (methyl bromide, chloropicrin, and sodium methyl dithiocarbamate) which are used on a smaller scale.

Commenting on cost of application, Mr. Taylor indicated that for field nematocides (which are applied by specially equipped tractors) cost is in the range of \$20 to \$30 per acre. The field nematocides are used only where the grower will make a good profit on his investment.—the principal current market being tobacco in the southern states, pineapples in Hawaii, and vegetable crops in various parts of the country. A

(Continued on Page 120)

MEETING last month in Los Angeles, more than 600 members and guests of the California Fertilizer Ass'n. were welcomed by Howard H. Hawkins, president, to the organization's 35th annual convention held November 9-11 at the Ambassador Hotel.

Sidney Bierly, general manager of the California Fertilizer Ass'n., in his annual report told members, "The general outlook is for stability in prices of the things you will have to buy, in wages, employment, and for more normal growth in the economy as a whole."

Dr. Russell Coleman, executive vice president of National Plant Food Institute, advanced a few predictions about the future of the farm operation, and specifically suggested that by 1975 fertilizer production will probably double. This result will necessarily follow, he believes, because with a greater demand for food and a lower farm population, it will be essential for farmers to use every chemical aid they can to raise production levels. Only 12% of the population now live on farms, but by 1975 Dr. Coleman predicted this will be down to about 5%. Specialization in farm production will continue to grow, he believes, and productivity per farm worker will continue to increase.

Fewer farmers to buy fertilizer will probably cause a marked change in the industry's method of marketing. Instead of having to market plant food through dealers and middlemen, the fertilizer manufacturers probably will set-up sales directly to the farmer. This would be much easier to do with a limited number of customers.

Specialization on the farm will mean more efficient production; more output per worker. This will undoubtedly mean more fertilizer consumption. "Doubling consumption by 1975 seems to be a reasonably conservative estimate."

Chemical fertilizer is the common denominator in food production, Dr. Coleman observed.

Sound Credit Planning Urged in "Planning for the Future"— theme of CFA Conference

Soviet Russia has realized this. During the period 1951-55 the USSR increased fertilizer production 83%. By 1965 it will produce as much chemical fertilizer as the United States. The importance of chemical fertilizers in meeting health and hunger needs is also recognized by most other nations. In India today important research is under way to show that worn out soils can be brought to a high state of productivity with chemical fertilizers. Red China recognizes the value of fertilizers to solve her problems. In Korea chemical fertilizers and food are almost synonymous. "Without commercial fertilizer a solution to the food production problem of the world is impossible," Dr. Coleman concluded.

Credit as the "Lubricant" of Commerce was discussed by L. C. Kennedy, California Spray-Chemical Corp. Signs of tightening of working capital are again beginning to appear with increasing frequency, he observed. This results from a willingness on the part of some sellers to undertake the role of financing agency as well as manufacturers, distributors, salesmen, technical advisors, etc. In the beginning this takes the form of just minor concession in terms of sale. It soon progresses to the point, however, where seasonal financing is undertaken in an eagerness to obtain a bigger share of the business or to obtain some competitive advantage.

We should recognize, the speaker warned, that long-term credit is not patentable. Every decision that we make, whether creditwise or otherwise affects every other marketer in the industry. If our decisions are sound, the indus-

try benefits. If they are unsound, these decisions tend to drag the entire industry down to the lowest level. Eventually what should be a healthy industry becomes stagnant because it finds its money has been diverted from productive uses into competition with the banks or other financing institutions. Some firms in the fertilizer industry Mr. Kennedy asserted, are definitely suffering from credit abuses, perhaps brought on themselves or perhaps forced on them by others in the industry in their eagerness to obtain a greater share of the business. Some apparently don't get the message that their own and their customers' balance sheets of P & L are transmitting. Rather than helping the customer, the trend seems to be toward further over-loading the industry's credit capacity by piling unmanageable debt loads on the customer and a serious burden on our own receivables.

"There are many uses for working capital, and accounts receivable is a good one," Mr. Kennedy commented, "but there are very few of us who can take over the financing function of the banks. Once we get into the area of finance, it is difficult for us to retrace our steps and we find ourselves with none of the advantages such as security and all the disadvantages of risk and cost."

A panel discussion, "Building for the Future" was moderated by Dr. D. G. Aldrich Jr., Chairman, Department of Soils and Plant Nutrition, University of California. Mr. Kennedy continued his discussion of "sound credit planning for the fertilizer industry" on this panel, asking the question:

"Does this industry earn so much profit that it can afford to take over the functions of banks and other financing agents?—and for free." I would say the answer is NO. The industry has neither the facilities nor the resources to undertake the burden of financing which private governmental institutions are prepared to undertake."

No sale is complete, Mr. Kennedy emphasized, until the money is in the till. Equally important, no profit or benefit is derived until the last dollars are collected. The first dollars go to cover the cost of the product and experience indicates that the profit, if any, has to come from the final dollars collected.

Each company has its own limits and needs as to working capital, and the proportions and amounts that can be devoted to accounts receivable will vary by company. However, return on investment is being used increasingly as a criterion of the effectiveness of management or the validity of an investment. In an industry where 20% to 30% of the capital employed is being used to carry accounts receivable, return on investment is sharply affected by any change in management's attitude toward its credit planning.

Mr. Kennedy recommended that all firms firm up their credit policy. Put it in writing. Place the authority and responsibility for approvals and collections in one person or in a group of specialists supported so they can make credit decisions be management decisions too.

The second step in the credit planning is the development of procedures. Strongly advocated is the use of written credit applications prepared in front of the customer. Sound credit appraisals involve a basic knowledge of the facts and an analysis of what has been learned about the customer. Your own analysis of the customer should include such things as, is he honest, will he pay, which is perhaps more important than the question, can

he pay? Is he a good manager, does he have income from other sources, what is the profit potential to you, and if he is changing suppliers, why is he changing suppliers?

Successful credit planning involves the delegation of responsibility for the collection of accounts in such a manner that follow-up will be consistent and carried on in a manner which will foster continued patronage and good will. A good question at this point is, "When should a man be asked to pay his account? I feel he should be asked to pay for it when it is due, not when it becomes past due. We know that to wait until a customer's account becomes past due tends to breed antagonism and embarrassment and all too frequently by over-generosity in the matter of terms or the amount of credit given, we lose the customer to a competitor, or even worse, we do him such a disservice that he becomes financially embarrassed and his business ceases to exist."

J. Earl Cook, V-P., Bank of America, San Francisco, expressed optimism that California would continue to push its agricultural economy to even higher levels in the future. He believes that more fertilizer will be used, citing a hundred and sixteen percent in-

crease in the use of fertilizer in the west, from 1949 to 1957. Mr. Cook added;

"When banks establish a line of credit to the farmer we should, and our bank does assure itself that funds for all the necessary items used in production such as fertilizers are available either through the bank or from some other source.

"We have felt that we could be helpful to the farmer and the fertilizer industry by calling the attention of the users of fertilizers, through a series of ads, to the financial advantage to the farmer of accepting the cash discounts which you offer on your fertilizer materials by borrowing the necessary funds from the bank. Such an offer on our part can be of maximum assistance to the fertilizer industry only if your practice of cash discounts is firmly held."

Credit and financing discussions were of prime interest to the audience and several questions were asked of the panel.

Q—Could a committee be developed in the industry to assemble facts about fertilizer applications?

A—The panel said that credit managers would welcome the opportunity to sit down with industry to see where they could strengthen their position.

Moderator and speakers on the panel discussion "Building for the Future" were: J. Earl Cook, Bank of America, San Francisco; L. C. Kennedy, California Spray-Chemical Corp. Richmond; Daniel G. Aldrich, Jr., (moderator) Univ. of California, Davis and Riverside; W. L. Dixon, Jr., Pacific Guano Co., Western States Chemical Corp., Berkeley; Ralph S. Waltz, Wilson & Geo. Meyer & Co., San Francisco; James F. Sloan, J. F. Sloan Co., Salinas; and R. L. Luckhart, Collier Carbon and Chemical Corp., Brea. Also speaking on the panel was Demont W. Galbraith, Agriform of Northern California, Inc., Woodland.





New Spencer Sparger aimed at reducing corrosion problems offers a unique idea in design concept. Slits the length of the sparger release liquid evenly to achieve better distribution. Holes have been eliminated, and fabrication simplified.



At -2° F. SPENSOL 440 stays clear. Ordinary solution at right has salted-out material in bottom of bottle and in solution. (SPENSOL 440 (22-66-6) salts out at -17° F. SPENSOL 430 (20-68-6) salts out at 14° F.)

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New Money-Saving Products For Fertilizer Manufacturers:

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Good news for mixers is coming steadily from Spencer Chemical Company. Latest development is a completely new kind of sparger, built without pipes or holes, which aids distribution and reduces corrosion.

The Spencer Sparger releases solution through continuous slits on the sides for more efficient diffusion of liquid in the mixture. Quality of material is improved, ammonia loss is greatly reduced.

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Another recent development by Spencer Chemical Company is a pair of nitrogen solutions that can cut costs for mixers as much as \$1.97 per ton! Here's how:

SPENSOL 430 and SPENSOL 440 have a higher percentage of total nitrogen as fixed nitrogen, so you use less sulfuric acid in formulating your product.

In making 12-12-12, you cut sulfuric acid use as much as 123 lbs. per ton of 12-12-12. At a delivered cost of \$27.00 a ton of sulfuric acid, you save \$1.66.

This also lets you get as much as 1.3 more units of P_2O_5 from normal superphosphate, which costs about 24¢ less per unit than triple superphosphate. This makes an additional saving of 31¢, or a total saving of \$1.97 per ton!

Contain Less Water

Both solutions contain only 6% water, so you pay less freight, need less drying and less recycle. And for grades with low nitrogen ratio, you can use more low-cost anhydrous.

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Insist on SPENSOL GREEN (Spensol Nitrogen Solutions)

AGRICULTURAL CHEMICALS



Economic Trends

IN AGRICULTURE

Excerpts from an address by George Ferguson, Geigy Agricultural Chemicals, New York, presented at the Western Agricultural Chemicals Association meeting, October 15th, San Mateo, Calif.

IN view of the importance of chemicals as a means of lowering unit production cost, improving quality and reducing labor requirements, as well as the continuing trend toward larger farming units and the use of mass production methods in food and fiber production, we can only expect that use of chemicals will continue to grow for some years to come.

The outstanding trend in farming practice is specialization—both geographically and on individual farms. Such important farm products as wheat, apples, citrus, poultry, dairy products and others are, to a considerable extent, produced on "one-crop" farms.

Another major trend is toward greater and greater competition among agricultural producers, and among major producing areas. Under conditions of surplus production, there can be no other result than exceptionally keen competition. The low cost producer survives and his high cost neighbor sells out and moves to town.

Farmers are therefore extremely cost conscious with respect to the things that they buy, and this includes their Pesticide Purchases.

A considerable degree of vertical integration has taken place in the farm community, as a result. In some cases, this takes the form of cooperatives and, in other cases, it takes the form of the formation of subsidiary companies engaged in manufacture, distribution or

marketing. These subsidiaries to the crop production operations in many cases have better purchasing power and credit responsibility than normal dealer and distributor channels used by the supplying industries.

What does all this mean in terms of the problems of the agricultural chemical supplier? As a reflection of this keen competition and surplus production in agriculture, the pesticide industry has encountered considerable pressure for lower prices over the past few seasons which has resulted in decreased profit margins.

But we will not solve our problems by taking an ostrich-like attitude, sticking our heads into the sand and wishing for the good old days of the past. We are not selling to the farm market of 50 years ago or even 20 years ago. We are selling to highly industrialized agricultural producers, many of whom are vertically integrated, and all of whom are extremely cost conscious and fully aware of their purchasing power and financial position.

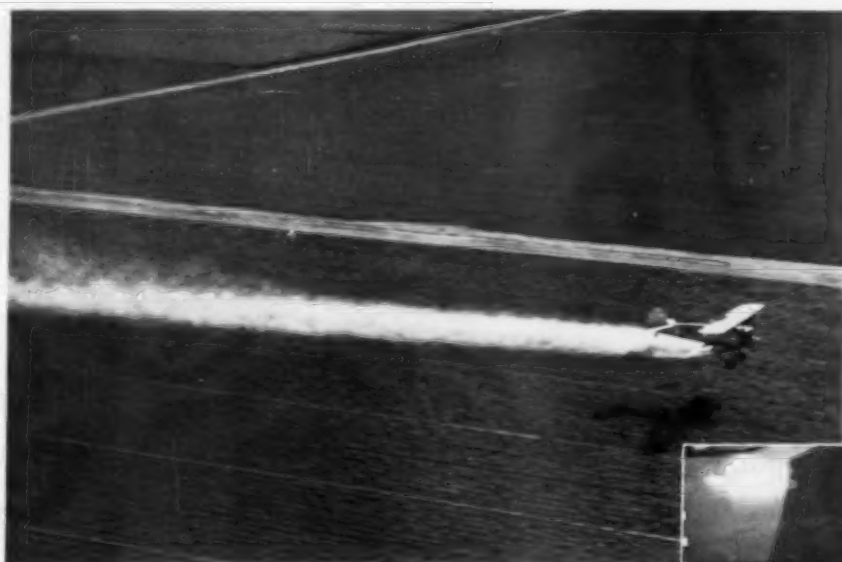
Let us not over generalize. The apple grower is perfectly willing to pay full retail price for a bottle of fly killer from his hardware store or super-market, but he will make every possible effort to obtain the most favorable price he can for the chemicals used in his apple orchard and, in many cases, he recognizes that his purchasing power and credit rating are superior to those of his dealer.

Let us not overlook the fact that the large producer is a technical expert in the production of his crop. We can send an expert entomologist out to look over his crop and tell him how many bollworm eggs or codling moth eggs he has, but the grower makes the decision as to what pesticide to use and what he can afford to pay for it, on the basis of his knowledge interpreted in terms of dollars of output versus dollars of income.

Let us not overlook the fact that the bulk of our market is composed of less than a half a million individuals from the standpoint of purchasing and decision making, and that this number will quite possibly decrease, even as agricultural production goes up to feed and clothe an expanding population.

The purchasing power of the agricultural market is often used to obtain money at low cost. I think that sometimes our industry overlooks the fact that money is also a commodity. The farmer under normal circumstances will try his best to obtain financing at the lowest possible cost. The lowest possible cost is usually zero, i.e., long term or harvest time credit. However, in some agricultural supply lines, it seems, from time to time, that customers are paid to accept credit by being able to obtain both the best credit terms and the lowest cash prices. This is, of course, characteristic of oversupply and keen competition.

(Turn to Page 112)



**THE SWATHMASTER
SPRAYS INSECTICIDES,
FUNGICIDES AND
HERBICIDES.
IT DISTRIBUTES
FERTILIZERS, SEED
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And when the next assignment calls for high or low density dust, seed or pellets, the pilot again resets his control, loads and takes off without any dispensing equipment change-over.

The Swathmaster was invented and completely field proven by Joe Sellers, prominent operator with 25 years experience in all phases of the aerial applying industry.

The all purpose Swathmaster is a corrosion resistant stainless steel, airfoil-like structure. It completely eliminates pumps, valves, booms, nozzles and special spreaders and the mechanical problems that are normal to these items.

The Swathmaster has no adverse effect on the flight performance of the airplane. It can be bolted to the new Transland T55 fiberglass-lined aluminum hopper and can be easily adapted to other sized hopper throats.

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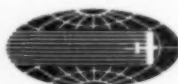


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AGRICULTURAL CHEMICALS

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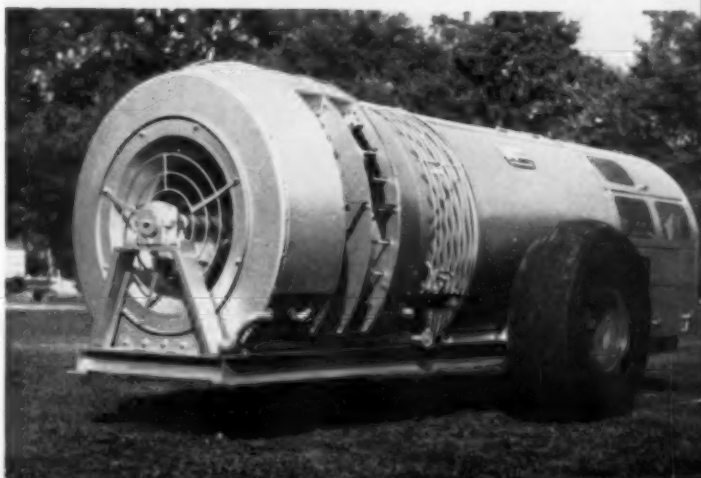
- **NATA Highlights**

- An analysis of operations
 - Fuels for the 985 engine
 - Problems in spraying contracts
 - CAB safety regulations
 - The spruce budworm spray project

- **Atomizing Nozzle Attachment**

- **Public Relations for the Applicator**

At right, a new line of orchard air sprayers introduced by F. E. Myers & Bros. Co., Ashland, Ohio. 224 Series (top pic) and 232 Series (bottom pic). Story on p. 51.





Officers of NATA and Heads of Local Applicator Groups seated (l to r.): Charles A. Parker, executive director NATA and William J. Lotzer, president of NATA. Standing: Cy Emery, Magnolia Aviation Co., Mississippi, M. C. Tedder, Red River Aero Dusting Co., Inc., Texas, William J. Tope, Tope's Air Spray, Montana, Robert E. Monroe, asst. exec. director, NATA, James French, Farmer's Crop Dusters, Calif.

- ✓ **Spraying problems**
- ✓ **Safety regulations**
- ✓ **Analyzing operation**
- ✓ **Credit and finance**

THE 19th annual Convention of the National Aviation Trades Association, held at the Pfister Hotel in Milwaukee, November 11-14, carried a full program of up-to-the-minute reports on the solutions to many current problems of the aerial applicators.

The applicators general session was presided over by Richard Reade, 1958 regional representative of NATA from Missouri. Mr. Reade, president of Mid-Continent Aerial Sprayers and Dusters, Inc., did an excellent job of presiding over all of the applicators sessions and conducting the question and answer forums after each talk.

In the business sessions on the final day, A. Biederman of A. Biederman, Inc., Glendale, California, was elected president of NATA. There were also three new replacements to the Agricultural Activities Committee—Lloyd Nolen of Mercedes Dusting Service, Inc., Mercedes, Texas, was elected chairman and vice president of agriculture, replacing Gale Hanson. George C. Boyd of St. Joseph Chemical Sprayers, St. Joseph, Missouri, replaces Richard Reade as region V representative and Walter Hensley, Hensley Flying Service, Havre, Montana, replaces Jack Hughes as region VII representative.

Robert E. Monroe, assistant executive director of NATA, led off the first applicators section with a talk on the "Ag Frequency" Solution, which was carried in full in

the November issue of *Agricultural Chemicals*. Mr. Monroe pointed out how the new business radio service, created by the Federal Communications Commission, in combination with new lightweight battery-powered portable equipment, offers a communications system which applicators can afford.

Nathan Boruszak, Sales Engineer for Motorola Communications and Electronics, Inc., exhibited samples of the new business and special industrial radio equipment available to aerial applicators and explained how to fill out application forms for the new frequencies which Bob Monroe had explained.

Fred E. Weick, Director of Piper Development Center, Piper Aircraft Corporation, gave the aerial applicators a run-down on their new PA-25 agricultural airplane, now called the Pawnee. Mr. Weick explained that the purpose of the new plane is the same as their PA-18-A Model for aerial application, with new features to improve its performance in aerial application. Some of the new features stressed were improved corrosion resistance with new structural materials such as stainless steel, polyester plastic and fibre glass, and a new corrosion-proof finish for all steel parts.

The safety features include improved field of view forward and down, with a low wing arrangement to provide better visibility on turns. The rear view is completely

open. Mr. Weick claims that the plane has good lateral control at lowest speeds and all controls are in a position for easy operation and are also shaped and marked plainly to eliminate the possibility of confusion.

Other features include heavier brakes, improved comfort for the pilot, with roomy cockpit and well-upholstered seat. The Pawnee has the pilot well to the rear of heavy load in a cockpit which resists collapse, and plenty of wing and fuselage ahead of the pilot. The hopper is located on the center of gravity of the plane so there is no trim change for light or heavy load.

The Pawnee will be available in small numbers in the early spring and Piper expects to reach maximum production by the end of summer.

Walter Kusiak, field service representative for Pratt and Whitney Aircraft, discussed the proper fuels for the 985 engine, stressing the need for using fuel with the lowest tetraethyl lead content. He pointed out that, while lead offers anti-knocking quality, it collects in the engine, causing reduced performance, undue wear and need for early overhaul. He recommends using the specified fuel, with regular inspection of the engine, spark-plug cleaning, change of oil and a regular complete overhaul. Mr. Kusiak mentioned that where it was previously recommended that engines be run near the 230 degree

highlight NATIONAL AVIATION TRADES ASSOCIATION Conference

maximum to burn off the lead from the plugs, they now recommended running the engine at 189 degrees to 205 degrees. He said that after several hot shutdowns at 230 degrees, trouble developed with the push rod seals, which cooked hard and then developed leaks. Mr. Kusiak also handed out copies of a booklet, "The Problem of Bogus Parts," published by the Flight Safety Foundation, Inc., in New York City.

Problems in Spraying Contracts

ARTHUR Gieser, Methods Improvement Section, Agricultural Research Service, U.S.D.A., discussed problems in spraying contracts arising between government and the applicator doing the job. He explained that some aerial applicators are over-extending themselves and bidding on overlapping programs—then drawing aircraft off one program to do the other. The only other alternative is to bring in ineffective planes from other sources, often resulting in poor application and lost time.

Mr. Gieser said that leakage is another major problem—especially when leaks occur over reservoirs, wild life sanctuaries, fish hatcheries and sensitive crops. Public clamor then causes a shut-down of the operations, resulting in more lost time.

Poor engines with frequent breakdowns are another major source of lost time, together with the problem that some pilots dump

their loads when the engine is performing poorly. Mr. Gieser pointed out that lost time from any or all of these reasons cannot be made up without additional equipment and if this is unavailable, the only solution is flying seven days a week and flying earlier in the mornings and later at night—resulting in the possibility of ineffective control, necessitating respraying. Respraying often requires covering a larger area than originally infested because the infestation has spread.

Another problem is that of the pilot who runs out of a load in midfield, then starts the new swath at the boundary, leaving an untreated area. Other pilots may leave untreated areas by continuing to spray when the hoppers are empty—or spraying the wrong areas. The emphasis which all good operators are striving for is the con-

trol of the insect—not just getting out the gallons.

Mr. Gieser stressed the need for better management in training of pilots to eliminate these difficulties and said that new spraying contracts are going to have to put more responsibility on the applicator for effective control. The applicator must supply the proper equipment including pumping equipment, on-the-job supervision of the aerial and ground crew, and pilots will have to be available for meetings during the spraying program. All these points will be written into future government contracts.

John Whiteside, Chief, Insect Control Section, Forest Service, USDA, in his talk on forest service program operations, reviewed the success of the spruce budworm program with spraying with DDT. He said that, since 1949, 20 million acres had been sprayed and gave credit to aerial applicators for the hazardous work.

He explained that Forest Service policy on aerial spraying work involves four separate bids: 1) purchase of insecticide; 2) transportation to airstrip; 3) the spraying; 4) observation—and said it was possible for one operator to be low bidder on all four phases—but bids must be submitted separately.

An important change on this year's contract work will involve insurance and payment bond as well as performance bond. The Forest Service contracts will be written in more detail and Forest

Panel of the Applicator Contracting Session. Left to right: Arthur Gieser, USDA, Methods Improvement Section, Agricultural Research Service, U.S.D.A., discussed problems in spraying contracts arising between government and the applicator doing the job. He explained that some aerial applicators are over-extending themselves and bidding on overlapping programs—then drawing aircraft off one program to do the other. The only other alternative is to bring in ineffective planes from other sources, often resulting in poor application and lost time.



Service wants aerial applicators to work as a team with the Forest Service to assure successful pest control without wildlife damage.

The outlook for 1959 aerial spray contracts in the four regions involved is that about 800,000 acres will be sprayed in Montana, 300,000 in southern Idaho and 25,000 acres in Arizona for spruce budworm control. In the lake states, 13,000 acres will be sprayed for budworm, tent caterpillar and saw fly, making a total for all Forest Service contracts of 1,138,000 acres to be sprayed.

Safety in Aerial Spraying

IN the applicator safety sessions, E. Clark Woodward, Safety Director of A. O. Smith Company, set down the problems and solutions of any safety program. He said that safety is just a job of selling people on the idea of protecting themselves. The difficulty lies in the fact that it is not possible for any person to be careful all the time and that it's also a natural human feeling to think "It can't happen to me."

He said that the best way to overcome these problems is to establish good safety habits and be sold on and practice these habits yourself. For instance, if you want your employees to take a shower after dusting, make sure you always do the same. All safety devices should be fitted so that they are comfortable to the user. Give your employees the right equipment, proper education and enforcement of regulations. Establish job routines and stay to them, establish checks on the routines and keep selling and enforcing the idea of safety.

For the person who continually makes mistakes resulting in accidents but is too valuable to discharge, he's probably not mentally or emotionally suited for the job and should be switched to a less hazardous position.

Oscar Bakke, Director of Bureau of Safety of the Civil Aeronautics Board explained that the

function of the CAB is safety regulation and investigation in aviation. He passed out copies of a booklet "Accidents in Aerial Application Activity for 1957" and commented on a few of the high points which the CAB has discovered from an investigation and analysis of accident causes. He pointed out the encouraging lack of injury in accidents where helmets, padding and belts were used. He pointed up the need for better ground observation to eliminate the major hazard of power and telephone line crashes and said that engine failures due to fuel exhaustion or improper mixtures are inexcusable in a well run organization.

Economics of Aerial Application

IN connection with the N.A.T.A. convention, the 3rd annual Agricultural Aviation Research Conference was held, November 10-11, under the sponsorship of the Agricultural Research Service, U.S.D.A. A number of valuable reports were presented on current research projects in the field of aerial application of pesticides. "Economics of Doing Farm Work with Airplanes" was the title of a talk by M. L. Upchurch and P. F. Phillipp, agricultural economists with the Farm Economics Research Division, U.S.D.A. and the University of Hawaii Agricultural Experiment Station, respectively.

They discussed the interrelationships between ground and aerial application, pointing out that the farmer chooses aerial application in preference to ground methods when: the job cannot practically be done any other way; when the airplane can do the job cheaper or better; or when the air avenue offers more flexibility or timeliness. When either ground or aerial application is possible, the price the farmer will pay is limited by the cost of the more economical methods. When only the airplane can do the job, the price the farmer will pay is limited by the contribution that spraying will make to the value of the crop.

"Agricultural airplane opera-

tors prosper," the speaker observed, "in relation to the efficiency with which individual jobs can be done and the amount of time equipment can be used during the year. A high degree of efficiency has been developed in the spreading of fertilizers on rangeland by air in New Zealand. Construction of airstrips close to areas being fertilized and the bulk handling of fertilizer contributes materially to this efficiency. With these innovations, airplanes have been timed in as little as three minutes for a round trip, including take off, spreading of load, landing, and reloading ready for take off again. Mechanical loading takes as little as 45 seconds. There is considerable room for improvement in the efficiency in doing farm jobs with airplanes in this country.

"The airplane operator must meet heavy fixed costs of interest, depreciation, ground facilities, and salaries of permanent personnel. Widespread use of equipment throughout the year helps reduce overhead costs per hour of operation or per acre of the job. Greater flexibility of equipment, encouragement of off-season work, and geographic dispersion to meet peak loads in different regions, are some ways operators may increase efficiency of equipment use.

"As farmers become increasingly aware of the jobs that can be done for them by air equipment, and with increasing size of farms and increasing specialization in farming, use of airplanes in agriculture will increase if jobs can be done effectively and efficiently."

J. H. Henley, President of the Texas Aerial Applicators Association, discussed Part 75 developments. Mr. Henley said, in spite of past stories published in national publications about the highly hazardous occupation of an aerial applicator pilot, statistics prove that he has less accidents than pilots engaged in other phases of general aviation. He said the aerial applicator of today is a highly skilled and professional
(Turn to Page 107)

An Atomizing Nozzle Assembly Attachment

HIGH-velocity air streams have been used for a number of years to help break up and propel sprays to plant foliage and other surfaces in a wide range of applications. This is a report of a nozzle-positioning attachment to utilize the air stream delivered through the dust tubes of a row-crop duster-sprayer to convey and circulate an atomized spray to and through the plant foliage.

The attachment, located at the end of the dust tubes, consists essentially of a streamlined nozzle body and stem that holds the nozzle in position. The atomizing nozzle employed is similar in design to those used in oil-burning heating systems to deliver finely atomized sprays under moderate pressures. In general, this nozzle delivers the insecticide in a cone shaped pattern, the spray break-up occurring within the nozzle or as it leaves the nozzle orifice. The high-velocity air stream discharging around the nozzle picks up the spray, breaks it up to some extent, and conveys it to the plant, forcing it within the plant canopy.

The streamlining of the nozzle body reduces the amount of air turbulence through the dust outlet to a minimum. The directed high-velocity air through the dust outlet usually is sufficient to overcome the effects of normal surface winds and agitates the plant so that the spray circulates through it.

The directed air blast from each side of the row also carries a portion of the spray across the planted row. In the plant area, each air blast impinges against the air blast from the opposing outlet, resulting in the air stream taking an upward path. This helps in depositing material on the under surfaces of foliage on both sides of the row.

Pictured is a working drawing of the assembly unit. This unit is mounted in a sleeve which clamps over the flange of a 90 degree elbow on the dust tube. The nozzle assembly may be made as an integral part of the dust tube by mounting it directly to the flange of the elbow. The separate sleeve mounting, however, does offer some additional advantages in that sleeves of variable lengths can be used to release the material closer to the plant for variable row spacings employed for different crops. The 90 degree elbow fittings should be made adjustable so that the outlet direction can be changed to fit the crop being treated. This can be accomplished by slitting the top flange of the elbow and clamping it securely to the dust tube with a hose clamp around the flange or mounting a tightening bracket similar to that shown in the illustration for the nozzle adapter.

The ability to rotate the dust-outlet elbow allows the operator to position the discharge for variations in plant size and growth

habits of different crops as well as for different cultural practices. By raising the delivery-outlet position and directing the spray downward, the tops of low-growing crops such as strawberries may be treated. In the case of potatoes, however, the under sides of the leaves may be

(Turn to Page 109)

Transland Equipment Folders

Transland Aircraft, a division of Hi-Shear Rivet Tool Co., 2600 West 47th St., Torrance, Calif., is offering a new series of brochures describing Transland's complete line of dust and liquid spray aerial applying equipment.

The firm's products include dust and liquid hoppers, agitator gates, spreaders, pumps, dump and pressure regulator valves, plumbing, booms, nozzles, pilot controls, Sellers Swathmaster dust-spray kit, and Transland dust and spray kits. Also available is the new Transland equipment price list.

New Myers Orchard Sprayer

A new line of orchard air sprayers, designed to handle spraying needs of both small and large orchards, is being introduced by F. E. Myers & Bro. Co., Ashland, Ohio.

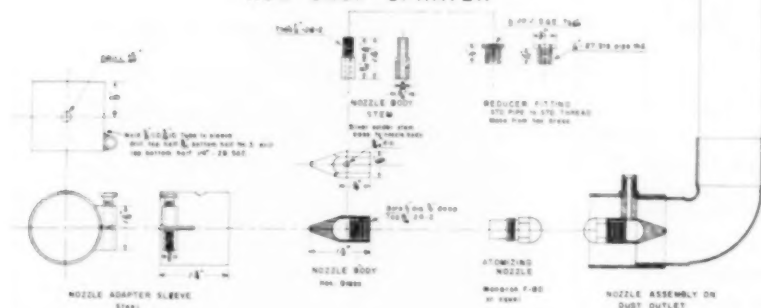
The new line, offered in a 224 Series and 232 Series, has been successfully field tested in application of dilute, semi-concentrate and concentrate chemicals for control of fruit pests, insects and diseases, without sacrifice to tree vigor or fruit finish.

The sprayers were designed for uniform application of all chemical solutions used in orchard spraying. Even highly corrosive spray chemicals can be applied without damage to the sprayer, it is claimed.

Flying Farmers To Tour

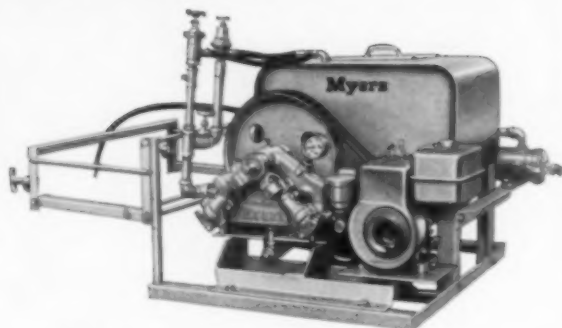
The National Flying Farmers' Association is sponsoring a Florida tour, Dec. 6 to 12. The tour will be headquartered in Orlando and will include trips to Fort Lauderdale, Pompano Beach, and the Bahamas.

ATOMIZING NOZZLE ASSEMBLY
FOR
ROW CROP SPRAYER



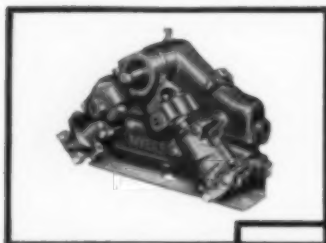
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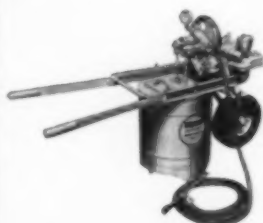
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PEST ROUNDUP

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward



Tomato Fruitworm Active

THE tomato fruitworm during October was prevalent in pepper fruits in Kent and Sussex Counties, Delaware. Heavy feeding was recorded on lima beans pods in New Castle County. In Escambia County, Alabama, the insect caused heavy damage to snap beans by feeding on the pods. Young fruits and blooms of eggplants were damaged locally in Alachua County, Florida. Lettuce in Dona Ana County, New Mexico, was damaged by the tomato fruitworm during October as was the same crop in Stanislaus and Alameda Counties, California.

The European corn borer caused considerable loss to pepper fruit in Delaware during 1958, particularly in lower Kent and Sussex Counties. Even where controls were used, some losses ran as high as 50 percent due to borers in the fruit and new borings in stems were common in October.

Cabbage loopers were heavy on broccoli and greens in the Eastern Shore section of Virginia during late October. Controls for the pest were not giving satisfactory kills. Lettuce in areas of Deaf Smith County, Texas, was damaged up to 30 percent. Damage by the pest to lettuce also was reported from Dona Ana and Eddy Counties, New Mexico. Utah was experiencing more damage from the cabbage looper than common for this season of the year. In California, cauliflower in the Watsonville area

of Santa Cruz County and potatoes in the Stronghold area of Modoc County were being damaged.

Among the other active truck insects were leaf miners in Florida where damage was reported to tomato, pepper, and squash plants in Broward County and tomato plants in Dade and Pinellas Counties. Damage also was reported on leaves of beets in Bland County, Virginia, and tomato plants in Santa Barbara County, California.

Spotted Alfalfa Aphid

The spotted alfalfa aphid was taken in the State of Washington during October. Infestations have been reported from the Washington Counties of Asotin, Benton, Walla Walla, and Yakima. Nez Perce County, Idaho, was reported as infested in October. This is the first record of the pest in northern Idaho. Additional Oregon Counties reporting the spotted alfalfa aphid were Wasco, Umatilla, Gilliam and Morrow. In Umatillo County many infestations appeared serious enough to delay plant development in 1959.

The spotted alfalfa aphid has been relatively light throughout the season in Nevada. It is interesting to note that the imported parasite *Trioxys utilis* was taken in Nevada for the first time. Populations in parts of northeastern Utah ranged from moderately numerous to damaging in all alfalfa fields examined. California populations were generally light to medium with some heavy popu-

lations in Stanislaus and Contra Costa Counties. The insect was being controlled by parasites and predators in Lake County. Yuma County, Arizona, populations were light by late October but building up rapidly. Population build-ups in northeastern Colorado were such that spring-seeded alfalfa might be damaged. Populations in the Republican Valley of Nebraska also were high but were relatively light in Kansas. The first serious loss of the season in Oklahoma was from Custer County where considerable damage occurred to the last cutting of hay. Light infestations were reported from Alabama and Virginia. A fall survey of West Virginia alfalfa fields was negative for the aphid.

The pea aphid increased during October in several widely separated states. Irrigated alfalfa in Whitman and Asotin Counties, Washington, was damaged by the insect. Local heavy populations were recorded in Santa Cruz County, California, in barley with vetch cover crop, on alfalfa in central and northern Utah Counties and southern Nebraska. Population increases of the pea aphid were noted on alfalfa in southern New Mexico counties while being recorded as prevalent to abundant locally on red clover and alfalfa in Delaware.

The greenbug was found to be heavy in Garfield County, Oklahoma, during October. With proper conditions this potential provides the possibility of a heavier than normal population in the spring of 1959.

Recent surveys listed the southwestern corn borer in eight new Arkansas counties. The insect has now been found in all Arkansas counties except Mississippi. In one Sebastian County field, lodging of corn caused by the insect was 18 percent. A few fields of late corn showed 60 percent infestation, with heavy lodging expected later. Missouri surveys recorded the insect for the first time in Dunklin and Ripley Counties. This is the furthest east the southwestern corn borer has been found in the state and thus it becomes a potential pest of the Mississippi delta farming area of southeastern Missouri.

Other Interesting Insect Notes

It is particularly interesting to note that Mexican fruit fly trapping along the California-Mexican border had been negative in 1958 through October. The last capture in Baja California, Mexico, was on August 22, 1957, and in San Diego County, California, July 22, 1957. Of the 163 flies trapped in previous years in this border area, 146 were caught in June, July and August. The total catch for California since the first specimen was taken is 12 Mexican fruit flies.

In a recent issue of this magazine the pink bollworm of cotton was reported as having been found in Maricopa County, Arizona. Since that report specimens have been collected from Pinal County. Also outside the 1958 regulated area, specimens have been taken in Faulkner, White, Drew and Ashley Counties, Arkansas, and Union, Lincoln, Grant and Rapides Parishes, Louisiana.

Screw-worms caused considerable concern to live stock growers in parts of Texas, New Mexico, and Nevada during October. In the eradication area of Florida, Pasco County had reported only 11 cases during 1958 through October. Several cases have been reported in recent weeks in the Montgomery area of Alabama but the release of irrigated flies continued and some sterile egg masses were collected.

Business Promotion Thru Public Relations

By Lester F. Allen

Shell Chemical Corporation

PUBLICITY is one of the most important tools a custom applicator has in letting the public know about him and the things he does. It is his means of telling his story to his neighbors.

Often publicity is confused with advertising in the public's mind. Actually there is a distinct difference between the two. Very simply, it is this. Advertising is the story about a business that the operator would like to see in print. Publicity is what an editor feels his readers would be interested in reading about a business.

If an aerial applicator decides to tell farmers that he is the best aerial applicator in the state, he would simply write this down and pay anywhere from \$15 to \$500 to have the paper print it. This is advertising.

Public relations sets out to accomplish the same goal but in a little different manner. If an applicator wants things said about him but he wants a newspaper editor to do the job for him, he must give the editor a story people will want to read.

The first thing an applicator must consider is what he wants to say. This sounds simple but it is surprising how many businessmen aren't aware of what they have to say to their customers. Three of the most important types of messages an applicator could place before his potential customers are business, community information, and emergency messages.

Unfortunately, the information that aerial applicators are capable of performing certain services more efficiently, easily, and economically than farmers and growers can do the job themselves is not newsworthy. If someone wants to see such messages in print he will have to buy the space

and advertise. There are ways, however, in which he can weave these ideas into stories that newspaper editors will find interesting to readers. In the case of an infestation of insects, for example, an applicator could contact the local editor and give him the story. He could describe what is known about the infestation, when it may be expected in local areas, and how it can be controlled. Included in the story can be a plug for the use of aerial application to control the pest.

Other occasions for business messages are the arrival of new equipment and the hiring of new personnel. The applicator may offer a new product. He may have participated in a civic project or may be away from his home location on an important control program. All of these items have news value and they establish the thought in the reader's mind that the applicator is an alert businessman, aware of the latest control techniques to assist his farm customers.

If an applicator wants to get publicity, he has to seek it. There is nothing egotistical in this—it is simply a business tool. Through well-prepared publicity, an applicator can create an impression about himself without making a direct statement.

Community information messages are used in the main to inform the public about agricultural chemicals and to combat scare stories that continually crop up when large spray programs take place. Situations like this develop because the public is not informed. It is important, therefore, that when an applicator is involved in a community program, he should let the public know exactly what

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LISTENING POST

By Paul Miller



This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Mycology and Plant Disease Reporting Section, Plant Protection Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Soil Treatments for Control of Dry Rot Disease

CHAS. J. Gould of Washington State College reports¹ results of experiments to test the efficiency of certain chemicals applied as soil treatments for the control of the dry rot disease (caused by the fungus *Stromatinia gladioli*) of gladiolus in western Washington.

Since fields of sufficient size with uniformly infested soil were not available for the tests, soil in which gladiolus had never been grown before was placed in large sewer tiles and artificially infested with cultures of the fungus grown on oats. After the soil was treated corms that were apparently free from dry rot were planted. In both 1956 and 1957 the corms were selected from stocks supposed to be disease free and were dehusked and examined carefully, but a few internally infected corms must have escaped detection in both years, judging by results.

Experiments in 1956:

The soil was infested on April 16, treatments were applied on April 19, and corms were planted May 8. Best results were obtained from Tersan. With this fungicide the soil treatment before planting was followed by bimonthly drenches at the rate of 350 pounds per acre. Next in order of control was Vapam at 400 and 500 pounds. Mylone at 255 pounds, Vapam at

600 pounds, Vapam at 300 pounds, Vapam at 200 pounds, and Mylone at 128 pounds (all figures refer to active chemical) per acre, followed in decreasing order of effectiveness. (See Table 1 for composition of the treatment materials.) The largest number of healthy corms was obtained from treatment with Tersan, but some concentrations of Vapam and Mylone produced corms with greater average weight. Some injury was noted from Vapam used at the higher rates.

Experiments in 1957:

Procedure—In 1957 the experimental soil was infested with oat cultures of the fungus on March 11 and treated on April 15. Sterilized oats to equal the amount used in the fungus cultures were mixed with soil in the control containers on April 15. The corms used were size 5 of the Spotlight variety; they were planted on May 15 and harvested on October 21. Eight hours before planting on May 15, infested soil that was treated with Vapam was rotovated.

Treated corms were used only in the Tersan treatments; they were given a 5-minute dip in a Tersan solution at a concentration equal to 8.2 pounds of active material in 100 gallons of water. Drenches of Tersan were applied June 14 and July 25.

Results—Dr. Gould remarks that variation among the three

replications of the 1957 trials was somewhat greater than had been observed in previous experiments, and that losses caused by the disease were less than usual, and especially less than during the preceding year. The smaller loss may have been due, at least partly, to cooler summer weather in 1957.

Results are summarized in Table 1. All treatments produced some good results. Following are comments on the best treatments:

Tersan produced the greatest number of healthy corms; Vapam was next in this respect. Vapam, then Mylone and Tersan, produced greatest total weight of corms. Treatment with Mylone resulted in highest average weight of corms; next in order were Vapam, RE-4334, Thioneb, and Tersan. Dr. Gould notes that in the best treatments number of corms was in inverse proportion to size of corms, perhaps because of growth competition.

Doubling the amount of water did not improve the effectiveness of Vapam at the regular application rate. A slight increase in number of healthy corms resulted when two drenches of Tersan followed the regular Vapam treatment.

Tersan was more effective when applied at the full regular rate than when used at half strength.

The controls indicated that apparently no benefit and perhaps some slight injury resulted from treatment of disease-free soil with either Vapam or Tersan, at the rates employed in these tests. The Vapam-treated non-infested soil

¹Charles J. Gould, "The dry rot disease of gladiolus," Plant Disease Reporter, vol. 42, no. 9, pages 1011-1024, September 15, 1958. Table 1 as in original article.

was not rotated prior to planting, however, and it is possible that enough of the material might have been retained in the soil to cause injury.

When only 50 instead of 100 corms were planted in non-infested soil, flower production was considerably increased while average corm weight and yield were reduced. Also, loss from natural corm-borne infection was slightly increased for reasons not understood at present.

Discussion of 1957 Results:

Best results were obtained from Vapam and Tersan. These materials gave yields definitely larger than yields in untreated soil. Dr. Gould states that control was not so effective as desired, however, and that consequently neither material could be considered to provide a complete solution for the problem of controlling soil-borne dry rot in western Washington. Nevertheless both materials gave sufficiently promising results to justify trials by growers, if cost should permit. According to the results of these experiments minimum

rates of Vapam and of Tersan should be about 400 pounds and 300 pounds, respectively, of active material per acre. For most commercial operations these rates would be too expensive, but amateur growers might find them practicable.

The 2 weeks recommended in other locations is not a long enough interval between treatment with Vapam and planting in Western Washington. Commercial recommendations now call for at least a 3-week waiting period, or for 4 weeks if the soil is heavy or rainfall has been heavy. Dr. Gould remarks that Vapam might give better results with some other method of application, and that in western Washington summer applications under warmer conditions might be more effective.

Perhaps because of the lower summer temperatures Tersan did not give such good results in 1957 as formerly. In the Tersan treatments in both 1956 and 1957 average corm size was slightly reduced.

The effectiveness of Mylone might have been increased by an-

other water seal although the soil was moist when the material was applied. Better results might have been obtained from a higher rate of application also, judging from results of the 1956 tests.

Teflon Hose Catalog

A broad selection of hoses of Teflon and related products are outlined in a 66-page book offered by Aeroquip Corp., Jackson, Mich. The catalog provides dimensional information, engineering data, assembly instructions, and other facts about Aeroquip medium and high pressure hoses of Teflon and "super gem" fittings for aircraft applications.

Fertilizer Trailer Spreader

Simonsen Manufacturing Co., Quimby, Ia., offers a tractor-drawn trailer spreader for application of dry fertilizers. The liquid fertilizer dealer can replace his nurse tank with the new unit for a couple of months of dry fertilizer, before the liquid season starts.

Table 1. Effect of fungicidal treatment on the yield of flowers and corms of gladiolus planted in non-infested and dry rot infested soil, 1957. Results are the total yields from three replications of 100 corms each. Materials applied dry and rotated into the soil unless indicated otherwise.

Soil	Number corms		Fungicide applied	Rate per acre active (lbs)	Number Flowers	No. corms harvested			Weight in grams	
	planted	Special per tank condition				Healthy	Dis.	Total	Total	Av. per corm
Not infested - MSL ^a	50	—	None	—	84	215	60	275	1675	10.05
Not infested - MSL ^a	100	—	None	—	19	277	12	289	3161	10.94
Not infested - MSL ^a	100	—	Tersan ^b	300	6	276	10	286	2668	9.33
Not infested - MSL ^a	100	—	Vapam ^c	436	18	282	11	293	2763	9.43
Infested - Silt	100	—	None	—	0	217	43	260	2146	8.25
Infested - MSL	100	—	None	—	0	157	38	195	1813	9.30
Infested - MSL	100	70 ^d	None	—	48	134	97	231	2395	10.37
Infested - MSL	100	Wet	None	—	0	192	30	222	1589	7.16
Infested - MSL	100	—	Mylone	170	1	161	85	246	1737	11.13
Infested - MSL	100	—	RE-4334 ^e	200	0	167	57	224	2285	10.20
Infested - MSL	100	—	Vapam ^c	436	2	203	72	275	2882	10.48
Infested - MSL	100	—	Vapam ^d	436	3	195	75	270	2713	10.05
Infested - MSL	100	—	Tersan ^b	436	2	215	60	275	2675	9.73
Infested - MSL	100	—	Thione ^b	100	0	183	57	24	2279	9.50
Infested - MSL	100	—	Tersan ^f	150	2	183	62	245	2164	8.83
Infested - MSL	100	—	Tersan ^g	300	0	240	40	280	2541	9.08

^aMedium sandy loam

^bCorms dipped in Tersan (11 pounds per 100 gallons) and Tersan mixed dry with soil on April 15. Tersan drench (300 pounds in 5445 gallons per acre) on June 14 and July 25.

^cIn 5445 gallons water per acre followed by water application of 10,890 gallons per acre.

^dAs in c plus drenches of Tersan as in b.

^eCorms treated in Tersan at regular rate, but soil application at one-half the rate in b.

^fFungicides tested:

Mylone 85W = (85%) 2,5-dimethyl tetrahydro-1,3,5, 2H thiadiazine-2-thione.

RE-4334 = (4 pounds per gallon) N methyl-N nitroso-o-m-butyl carbamate.

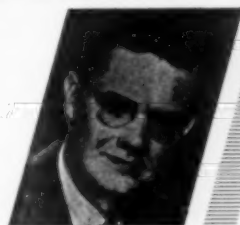
Tersan 75 = (75%) tetramethyl thiuram disulfide.

Thione-50W = (50%) polyethylene thiuram sulfide.

Vapam 4-S = (31%) sodium N-methyl dithiocarbamate.

WASHINGTON REPORT

By Donald Lerch



WATCH for more news from the National Plant Food Institute concerning a new program to persuade farmers to use more fertilizers. While NPFI is cautious about forecasting what the program will accomplish, early results in Georgia and North Carolina are encouraging. In fact, pilot results are so encouraging that pilot program areas are being more than tripled in 1959.

Key to the program is a community-wide drive to persuade farmers to test their soils, then use fertilizers wisely to build up soil fertility to maximum productivity. County agents, bankers, dealers, farm advisors—everyone in the community who has a stake in raising farm income—are enlisted in the program. One North Carolina county where a pilot program was run in 1958 reports that as a result farm income in the county is up \$1.5 million over last year.

Pilot programs in Georgia during 1958 were encouraging enough that the number of pilot counties will be raised from six in 1958 to 25 in 1959. Several pilot programs also are being initiated in the Midwest and elsewhere in the Southeast.

Background to the new program can be found in USDA statistics. Up until 15 years ago fertilizer sales went up and down in step with farm income. From 1940—the start of the war years—until 1952, fertilizer sales gained steadily. Since 1952, however, sales have levelled off at around \$1.25 billion to \$1.28 billion a year. The

new, intensified community action program is designed to start fertilizer sales moving upward again from the present plateau.

The coming year will put the program to a really severe test in pilot counties where it will be operating. The reason is that farm income is expected to drop several percentage points from the 1958 level. Thus, farmers will be faced with a decision as to whether to trim their fertilizer purchases to match reduced incomes, or to buy and use more fertilizers more wisely in order to gain the benefits of more efficient farm production.

The NPFI community action program effort is designed to tip the farmer's decision in favor of buying and using more fertilizers. The strongest factor in favor of the program's success is that whether overall farm income rises or falls, farmers who fertilize wisely and well make more money.

* * * * *

Look for a boom in Congressional activity as soon as the 86th Congress opens in January. The outlook here is for some new attempts to fashion farm legislation, more Congressional concern over finding new sources of tax revenues, and an upswing in Congressional investigations of business.

No one yet knows for sure what farm legislation the new Congress will propose, but farm-wise politicians predict that the Democrats will try to build an independent legislation record of service to farmers which they can take to the electorate in 1960. Several

Democratic Senators already have indicated they plan to introduce new farm legislation in this session of Congress. Plans presented so far would put more money into the pockets of smaller farmers; some would permit farmers more freedom to grow and sell farm products.

Whatever the overwhelmingly-Democratic Senate and House Committees may come up with for the farmer, the chances are that the Republican Administration will stick with its present farm program.

* * * * *

Insects are ready for the space age. USDA tells us that the house fly, flea, honey bee, eastern tent caterpillar, wax moth, fruit fly, and yellow fever mosquito have been sent more than 24 miles into the stratosphere without any apparently harmful effect.

Meanwhile, some enterprising Columbia University researchers have dredged up a live sand flea from the bottom of the Atlantic Ocean, 13,000 feet down. In its ascent, the sand flea survived a pressure change of 6,600 pounds per square inch.

Wherever man goes in the space age, if he wants to stay there, he'd better be pre-equipped with some good pesticides.

* * * * *

It looks as if we can expect a wave of serious discussions among entomologists about new sources for insecticides. The pace was set at a recent meeting at Cornell.

(Turn to Page 107)

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AGRICULTURAL CHEMICALS

Fertilizer Views and News

Dr. Sauchelli is Chemical Technologist for National Plant Food Institute.

By Vincent Sauchelli



Chemical Analysis or Agronomic Value — A Review

FERTILIZER control laws are designed primarily to protect consumers and, — indirectly, honest manufacturers. All reputable manufacturers are anxious to assist the control officials in their efforts to improve sampling and analytical techniques because they want a system that differentiates promptly and efficiently between honest and somewhat dishonest or sloppy practice. At the same time, they are inclined to hold out against the attempt to secure a level of homogeneity in the product which makes sampling easy, but which puts a cost burden on the farmer out of proportion to its value.

In the past, the agronomy factor has perhaps been ignored or subordinated unduly in planning chemical control research. Farmers receiving a report from the state chemist that the fertilizer he purchased was, let us say, deficient in one nutrient by a small margin below the official tolerance limit, do not always evaluate this information agronomically. The report may cause him to doubt the ethics of the fertilizer manufacturer solely on the basis of the adverse report. He does not consider the important fact that the fertilizer he purchased could be entirely satisfactory for the crop, and that despite the deficiency reported by the chemist, the fertilizer was in reality an honest value. Let it be emphasized strongly, we hold no brief for dishonest measure or sloppy practices. A purchaser is entitled to get what he is paying for. The point we are making is that, for

example a guaranteed analysis of 5-10-10, which is found to analyze 4.9-10.6-9.6, may be accepted as honest value from an agronomic or crop-producing viewpoint. The deficient fertilizer in this case would presumably produce the crop equally effectively as one with the exact 5-10-10 analysis. We know that some agronomists and control officials wonder whether segregation, as it frequently occurs in a fertilizer and is reflected in an aberration from the exact chemical analysis, may not be stressed unduly as to its effect on making the crop. The money penalty imposed on the manufacturer for the deficiency, while appreciable, may be less important than the unfavorable effect the report has on the public relations of the manufacturer. How tolerant should the control official be? This is indeed one of the most difficult problems facing the industry and the state regulatory office.

In Florida, a joint program went far to alleviate the problems. The study proved that the official method of analyzing the x-o-x type of fertilizer was inadequate to the purpose. The authorities graciously accepted the results, and adopted a different set of fairer and more realistic tolerances.

European Experience

These problems of analysis and their relation to corresponding effects on the growing crop are not confined to our country. European control officials and agricultural leaders also have been trying to resolve them, too. One of the best statements on the subject is

the following which was written by Dr. E. M. Crowther, shortly before his death. Dr. Crowther was at the time director of Rothamsted Agricultural Experiment Station in England. Wrote Dr. Crowther:

"Why do we trouble to analyze phosphate fertilizers? The manufacturer needs analyses of his raw materials and intermediate batches to control the operations in his factory. Even relatively small differences will allow him to make appropriate adjustments. The farmer's need is quite different. No practical observation and no field experiment can distinguish between say a 16% and an 18% superphosphate applied to field crop. Fine distinctions in grade or total plant food content are in fact, of little agricultural importance. The essential thing is to know where, when and how the fertilizer should be used. When the Acts were first framed, it may have been necessary to protect the farmer against a few unscrupulous or incompetent traders. This need may still remain, but it seems most important not to confine this 'policing' aspect of fertilizer analysis with the far more important one of providing the farmer and his advisors with the technical information needed for using fertilizers well.

"This may require something more than a single analytical figure by a conventional method. Thus, with basic slags or mineral phosphates, it is more important to know the kind and origin of the material than the total phosphorus content: In countries such as Holland and Denmark where

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Lettuce fertility trials conducted in Imperial Valley for the past two years under the direction of Dr. O. A. Lorenz indicate production increases of 2 to 4 times with proper phosphate application and in one case the difference resulted in a crop which could be harvested versus no crop at all.

In the 1956-57 season, trials conducted in cooperation with La Brucherie Farms of El Centro revealed the following results.

	Percent Cut
No phosphorus	15.3
160# P ₂ O ₅ /acre applied broadcast	64.2
160# P ₂ O ₅ /acre banded 3" below seed	61.5

The lettuce in this trial was planted November 5, 1956, harvested March 11, 1957 and all plots received adequate nitrogen. As can be seen the difference between the two types of phosphate application was not significant.

This same season phosphate trials were also conducted at the Meloland Experiment Station, of the University of California with the following results.

Pounds P ₂ O ₅ applied per acre	1st harvest	Yield—percent cut 1st & 2nd harvest	Total for season	Average weight per harvested head in pounds
0	0	0	0	0
60	34.2	54.3	84.1	1.81
120	50.4	67.9	88.3	1.86
180	58.9	72.7	87.5	1.84

Again in this trial all plots received adequate nitrogen. The variance in the total cut for the three rates of phosphate was not significant but there were striking differences on the 1st and 2nd cuts

revealing that one of the important effects of phosphate fertilization is to hasten maturity.

During this past 1957-58 season phosphate trials on lettuce were again conducted on the Meloland Station with the following tabulation.

Pounds P ₂ O ₅ applied per acre	1st harvest	Yield—percent cut 1st and 2nd harvests	Total for season	Average weight per harvested head in pounds
0	4	13	17	1.79
60	21	44	75	1.86
120	29	54	80	1.90

In this trial the lettuce was planted and irrigated on October 15, 1957 and harvested during February, 1958. Fertilizer was applied broadcast and folded into the bed on October 11, 1957. All phosphate rates were combined with nitrogen so that 60 pounds per acre each of ammoniac and nitrate nitrogen were applied to all plots. An additional 30 pounds of nitrogen per acre from ammonium nitrate was applied as a side dressing in the shoulder of the bed on January 15, 1958, giving a total nitrogen application of 150 pounds per acre.

The harvest data from this test again points up the fact that ade-

Station where these trials were conducted have received heavy phosphate applications for the past three years, which illustrates that the total PO₄ content in the soil is not always an accurate indication of that available to the plant and will depend upon the soil type and

conditions that prevail in the area.

The large response of lettuce plants to heavy fertilization is especially interesting since lettuce is a crop that removes only small amounts of phosphorus from the soil. In experimental studies it has been shown repeatedly that an acre of lettuce will remove only 15 to 20 lbs. of P₂O₅ from the soil, yet the phosphorus application needs to be many times this amount.

California Fertilizer Association Newsletter, Sept. 1, 1958.

Emmi for Seed Treatment

Emmi, an organic ethyl mercury fungicide manufactured by Velsicol Chemical Corporation, Chicago, has received widespread use in the gladiolus industry and for small grain seed treatments alone or in combination with heptachlor insecticide. The mammalian toxicity (LD₅₀ rats) is approximately 148 mg/kg. The empirical formula is C₁₁H₇Cl₆O₂NH₂.

The product has been tested against various organisms and has shown mycelial growth inhibition in the range of 5 to 25 parts per million. The phytotoxicity is of a

low order of magnitude, with no observed injury on many greenhouse and field crops. It has been shown to be a powerful inhibitor of spore germination in many fungi. It is an eradicant and protectant.

Emmi has been used for a gladiolus corm dip by commercial growers for the last four years with results against *Fusarium* rot and *Curvularia* rots. Most of this research work has been done by Dr. J.L. Forsberg, Plant Pathology Department, Illinois Natural History Survey.

From 1952 to the present, Emmi has been tested by a number of research workers for the protection and eradication of smut on wheat; oats and other small grain crops. It has given excellent results on these crops. It has been tested as an eradicant and protectant against apple scab. In certain areas MacIntosh and Cortland varieties were injured but in other geographical areas there was no injury. Emulsions of a 10% Emmi concentrate have been the main formulation in use.

Experimental work this year is being conducted on various fruit crops, seed treatments of small grains, foliar applications etc.

Pyrethrum Synergist

When 2-(2-ethoxyethoxy) ethyl 3,4-methylenedioxyphenyl acetal of acetaldehyde (ENT-20871) was added to sprays or aerosols containing allethrin, cyclothrin, or pyrethrins, a high degree of synergism was caused. This was demonstrated by the results of numerous experiments against house flies, mosquitoes, cockroaches, and Japanese beetles. In most tests ENT-20871 caused greater knock-down and kill than piperonyl butoxide or sulphoxide. When used alone ENT-20871 caused some mortality but little knockdown.

Experiments with stored aerosols containing ENT-20871 showed no loss of performance, but with stored sprays containing allethrin there was some loss. J. H. Fales, O. F. Bodenstein, and M. Beroza, *Pyrethrum Post*, 4, No. 3, 19-23, 1958.

Ureaform Produces Superior Sod-Building Fertilizers

A FERTILIZER mixture that produces a good "lifting" sod in from four to five months, contrasted with the usual two seasons of growth, has been developed through the use of ureaform nitrogens according to Dr. L. L. Baumgartner, agronomist and technical consultant to the Borden Chemical Company, New York.

The fertilizer mixture was compounded by J.A. DeFrance, A.J. Wisniewski, and J.R. Kollett, researchers at the Rhode Island Agricultural Experiment Station. The compound is 75 per cent ureaform, 10 per cent organic nitrogen, and 15 per cent synthetic nitrogen, mixed with superphosphate and potash to produce an analysis of 20-6-4.

Utilizing plots of turf containing 50 per cent Cheving's Fescue, 25 per cent Kentucky blue grass, and 25 per cent Merion blue grass, the fertilizer mixture was tested against Scotts' 20-10-5, a standard 8-6-2 (at equivalent rates), and mixes containing 100 per cent ureaform.

In addition to "Borden's 38," two other ureaform nitrogens, "Uramite" and "Nitroform," were used in the Rhode Island studies. All produced similar results.

The studies showed that mixtures containing 100 per cent ureaform and those with a large amount of ureaform, such as the 20-6-4 compound, produced a higher per cent stand and greater turf quality.

Some of the test plots were fertilized two weeks before seeding and an equal number were fertilized immediately prior to seeding. The dosage rate of fertilizer was calculated on nitrogen per 1,000 square feet.

Tests showed that eight pounds of nitrogen per 1,000 square feet produced the best results and, particularly in the spring, that plots fertilized immediately before seeding developed a stand

of grass of higher quality, Dr. Baumgartner said.

With the eight-pound dosage rate, a good "lifting" sod was developed in from four to five months. Sod of equal quality, if grown under conventional fertilizing practices, would require at least two seasons of growth, the Borden consultant said.

The Rhode Island researchers also conducted a series of tests using four-pound and sixteen-pound nitrogen dosage rates. The four-pound rate produced a good stand of grass, but of inferior quality, while the sixteen-pound rate caused injury.

Organotin Fungicides

Investigation of organotin compounds, with quadrivalent tin, has indicated exceptional fungicidal activity. A preparation based upon triphenyltin acetate has been trademarked as "Brestan" and tested at the Biologische Bundesanstalt, Branuschweig, where it was acknowledged to be effective at 1.8 kilograms per hectare (in a .3% spray) against *Cercospora* in beets and *Phytophthora* in potatoes.

The product is not dangerous to beets in the normal concentration of application. The LD50 when taken orally is 125mg per kg of the body weight of a rat. The range of effectiveness corresponds to that of the copper fungicides. In fungicidal efficiency, however, the active constituent, triphenyltin acetate, is more effective than copper.

Applicability of the material is limited, however, since it cannot be used on such crops as fruits, tomatoes, decorative and greenhouse plants, because these plants are too sensitive and would be harmed to some extent. Investigations to date indicate the preparation has its best application against the leaf spot diseases of beets, the potato blight, and the leaf-spot disease of celery. Dr. K. Hartel, based on report read at the TRI Conference, Frankfurt, Nov. 1957.



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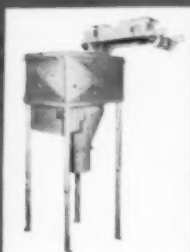
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U. S. D. A. Launches Campaign Against Witchweed

AN intensive effort to eradicate witchweed, a parasitic plant that attacks corn and some other crops, is getting under way in North Carolina and South Carolina, the U.S. Department of Agriculture announces. Congress has appropriated \$3 million to initiate the program, a cooperative undertaking by USDA, agricultural agencies of the two states, and farmers in the infested area.

This destructive foreign weed has invaded six counties of northeastern South Carolina and 12 adjoining counties in southeastern North Carolina. Farmers in the area are being asked to use or permit witchweed-killing practices on their land, beginning next spring. The cooperative eradication campaign will extend over some 75,000 acres of cultivated land and 20,000 acres of uncultivated land on 3,404 farms in the 18 counties.

To disrupt normal farm practices as little as possible, both chemical and cultural methods of eradication will be used.

Witchweed has not yet gained a stranglehold on the greater part of the infested acreage, and corn crops are still possible on some of the land there. Owners of such land will be asked to plant corn as usual. When witchweed comes up, pest-control workers of USDA's Agricultural Research Service will spray the fields with the herbicide 2,4-D.

On more heavily infested land, however, corn-growing is no longer profitable because of witchweed. On this land the plan is for farmers to "cultivate witchweed to death." They will contract to furnish labor, implements, seed, and fertilizer, for which they will receive payment from the cooperating control agencies.

Under this scheme a farmer will plant corn but will plow it under when witchweed appears and before the weed can make

seed. Then he will repeat the process with a second "catch" crop—sorghum or millet. Late in the fall, he will put in a winter cover crop, a small grain that will promote germination of more witchweed seed. Witchweed plants that develop will normally be killed by frost before their seed matures.

Stimulating witchweed plants to grow speeds eradication, for unless they receive a "go" signal from a plant on which they can germinate, witchweed seeds may lie dormant in the ground for years.

Sesone On Strawberries

Sesone, a Crag herbicide manufactured by the Union Carbide Chemicals Co., Division of Union Carbide Corp., New York, was reported to be a satisfactory herbi-

cide for use in strawberry plantings during the growing season.

In a recent report by Dr. Robert G. Hill Jr., of the Ohio Agricultural Experiment Station, Wooster, on weed control studies with strawberries Sesone was said to have no effect on established plants at recommended dosages. Sesone was used at the rate of three pounds per acre of sprayed area.

Nitrogen By New Dry Process

A new nitrogen generator packaged unit, piped and wired for the production of nitrogen atmosphere by combusting a mixture of air and natural gas, or any manufactured gas such as butane, propane, water gas or coke oven gas, is offered by the Gas Process Division, Lindberg Engineering Company, Chicago.

The atmosphere produced can be used for any application where a high nitrogen, CO₂-free, dry atmosphere is required.

Offers Dust-Free, Non-Caking Ammonium Nitrate

A new type of ammonium nitrate fertilizer that is dust free and will not cake during storage has been announced by Monsanto Chemical Company's Inorganic Chemicals Division. James E. Crawford Jr., director of marketing for the division, said that the new product, "Lion E-2," offers time, labor and money-saving advantages for both dealer and farmer, yet sells for the same price as ordinary ammonium nitrate fertilizer.

"It can be stored indefinitely," Mr. Crawford said. "It can be stacked high without bottom bags caking, and its higher density takes 20 per cent less space in storage and in farm machinery.

"The new product remains free-flowing even under unfavorable conditions. E-2's dust free characteristics make it easier and cleaner to use, with no clogged machinery and no loss of fertilizer, even on windy days."

In addition to offering non-caking and non-dusting qualities,

the product has a high density, hard prill, prill uniformity, is constant free-flowing and contains maximum nitrogen content.

According to E. G. Somogyi, director of research, Monsanto's new product remains free-flowing, because the cause of caking has been eliminated, by a processing technique, as contrasted with the industry's previous attempts to minimize caking by externally applied coating agents. Experiments in Monsanto's mixed fertilizer pilot plant have shown that the new product, when used in the manufacture of mixed fertilizers of a high nitrogen to P₂O₅ ratio, imparts its prill hardness and non-caking characteristics to the final product.

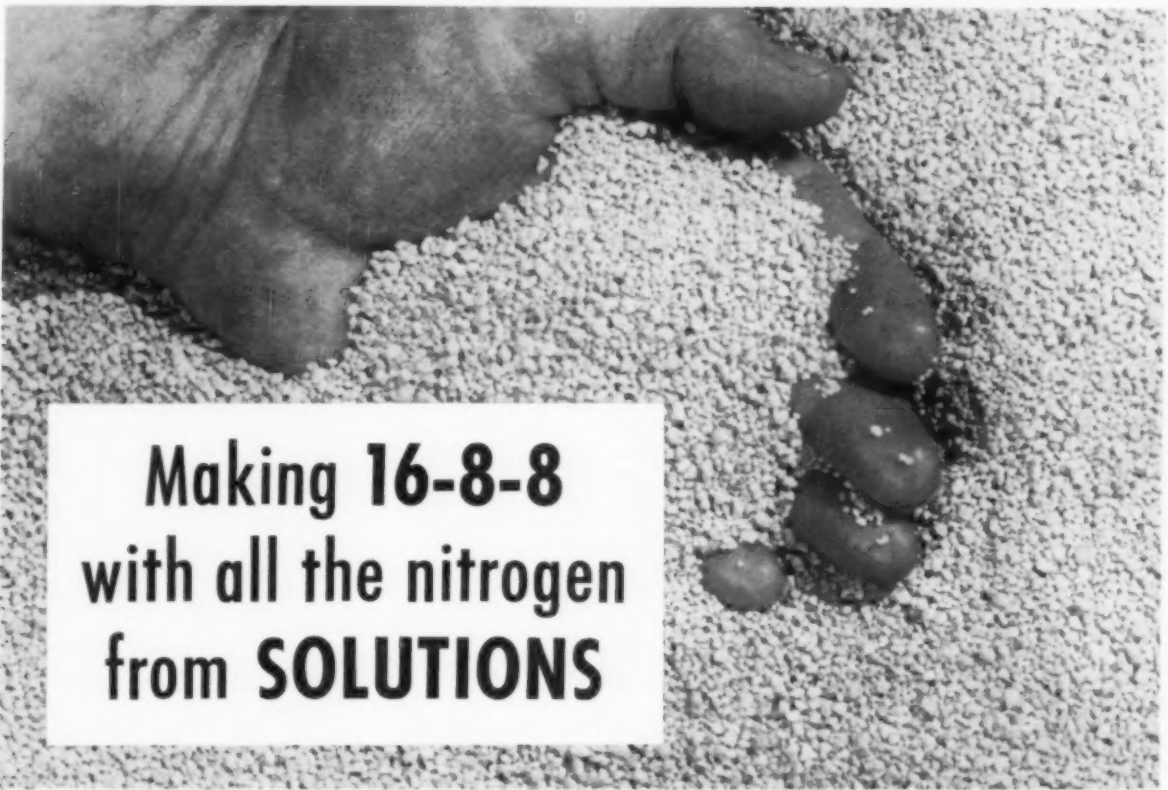
Monsanto is now manufacturing the new E-2 fertilizer, patents on which have been applied for, at its Luling, La., and El Dorado, Ark. nitrogen plants. It is available in both polyethylene and polyethylene-lined multi-wall paper bags.

Arcadian® News

Volume 3

For Manufacturers of Mixed Fertilizers

Number 12



Making 16-8-8 with all the nitrogen from SOLUTIONS

The **16-8-8** granular fertilizer, illustrated above, was produced by a new and different technique of progressive ammoniation, with *all* the nitrogen in the fertilizer derived from ARCADIAN® Nitrogen Solutions.

Perfectured by Nitrogen Division technical men, this new process involves the use of sulfuric acid with certain specified Nitrogen Solutions and no other nitrogen carrier.

Because all the nitrogen is obtained from Solutions, the cost of nitrogen is greatly reduced and there is room in the high-analysis mixture for normal superphosphate and other desirable ingredients.

Operation of the process requires certain modifications in standard ammoniating equipment, however the extra equipment cost is an excellent investment in view of the

many advantages obtained. There-cycle rate is low and permits full utilization of equipment with maximum output.

By this new method of ammoniation, air pollution is minimized and there is almost no loss of plant food. The 16-8-8, illustrated above, was formulated at 16.16-8.08-8.08. The end result of the process is a homogeneous product easily dried to 0.3% to 0.5% water. The extremely low moisture content helps the fertilizer to hold its quality over a long period.

This method is a major advance in the technique of manufacturing better fertilizers at lower cost. It will pay you to get all the facts on its simple operation and its many advantages. Contact: Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

For BIGGER Profits Put More N in N-P-K

It Pays to Make and Sell High-Nitrogen Fertilizers

Fertilizer manufacturers are faced with a golden opportunity to increase profits and expand markets by putting more nitrogen in mixed fertilizers.

Most of the leading fertilizer-consuming crops need more nitrogen than any other plant food. Corn, wheat and cotton require more than twice as much nitrogen as phosphoric acid, and far more nitrogen than potash. Many other crops are big users of nitrogen.

Yet the average mixed fertilizer contains less nitrogen than phosphoric acid and potash. To get the yields they want, farmers make up the difference with extra applications of straight nitrogen materials.

Trend to Straight Nitrogen

More nitrogen is sold as straight materials than in mixed fertilizers, and the use of nitrogen as straight materials is gaining faster than the use of nitrogen in mixed fertilizers.

Of course, it is not practical to supply all the nitrogen needs of some crops on some soils with mixed fertilizers. But, for most crops on most soils, it is practical, efficient, economical and profitable to supply more nitrogen in mixed fertilizers.

New Production Techniques

Today you are in a better position than ever before to take full advantage of this situation. The development of

new ammoniation techniques enables you to greatly increase the nitrogen content of mixed fertilizers, with all the nitrogen derived from low-cost ARCADIAN® Nitrogen Solutions. Production of high-analysis, high-nitrogen mixed fertilizers is easier than ever before.

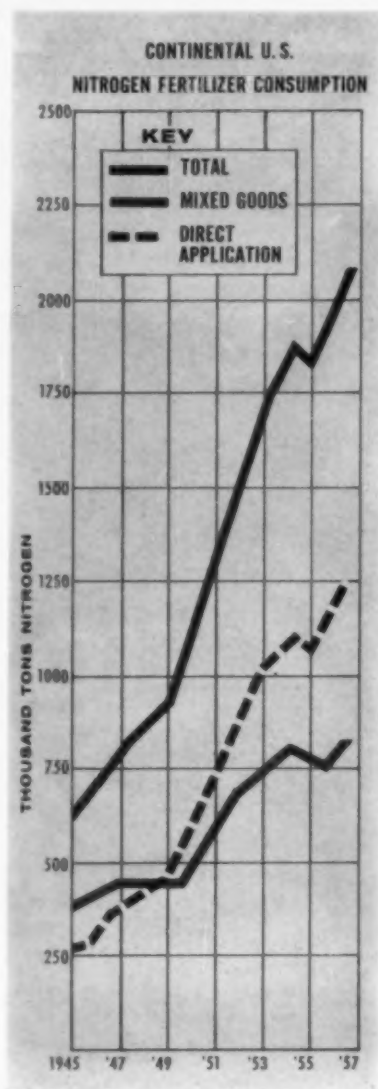
Bigger Dollar Volume

When you balance your fertilizer with adequate nitrogen to meet crop requirements, you also help to insure the best possible return from the phosphorus and potash in your fertilizer. Research has proved that sufficient available nitrogen increases a plant's efficient use of phosphorus and potash.

By producing high-analysis, high-nitrogen mixed fertilizers, you can put a bigger dollar volume of tonnage through your plant. You can also save money in storage and shipping costs per unit of plant food. These costs are becoming more important, with increasing freight rates and the necessity to warehouse more tonnage in late seasons.

Helps Your Dealer

With high-nitrogen fertilizers, you increase the farmer's profit, your profit and your dealer's profit. Your dealer can make better use of his storage and trucking facilities. He has less storage cost per dollar of inventory and he hauls a higher value pay load. Most important of all, he



can supply his farmer customer with his complete plant food requirements in a one-sale, one-package deal. This builds exclusive customers and minimizes the danger of losing business to a competitor.

Ask Nitrogen Division

It will pay you to start now to make and sell more high-nitrogen mixed fertilizers. Get all the facts on the new and different production techniques that enable you to produce high-nitrogen mixed fertilizers with all the nitrogen derived from low-cost ARCADIAN Nitrogen Solutions. Contact: Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.

PLANT FOOD USE COMPARED TO CROP NEEDS

Crop	Acres Fertilized	Average Pounds Used Per Acre *			Pounds Needed Per Acre For Good Yield			
		N	P	K	N	P	K	
Corn	60%	27	28	25	160	60	120	100 bu.
Cotton	58%	49	31	25	105	45	65	750 lbs.
Wheat	28%	18	27	19	70	30	50	40 bu.
Oats	30%	17	28	20	75	35	95	80 bu.

*On acres receiving fertilizer.

Cold Weather Handling of Nitrogen Solutions

Nitrogen Solutions with a high content of ammonium nitrate or urea salts are an economical source of nitrogen for production of high-nitrogen mixed fertilizers. But, certain precautions are required in handling these Solutions during cold weather, due to their tendency to "salt out."

Because of the high level of dissolved salts in these Solutions, their "salting-out" temperature is higher than that of Solutions containing more free ammonia or water. It is also higher than atmospheric temperatures during winter months in some areas.

The "salting-out" temperatures for all **ARCADIAN® Nitrogen Solutions** are shown in the specification chart on the following page.

These are the Solutions' temperatures at which crystals begin to form. Crystallization of nitrogen salts does not start until the temperature of the Solution actually reaches the "salting-out" or "saturation" point.

Accurate Laboratory Tests

The exact "salting-out" point of each Solution is determined in the Nitrogen Division laboratory by gradually cooling the Solution until crystals start to form. "Salted-out" samples are then warmed and dissolution points of crystals are checked against previously-determined "salting-out" temperatures, to avoid any possibility of inaccuracy due to super cooling.

Nitrogen Division technicians chill the Solution until crystals occupy much of the visible Solution space. The Solution is then warmed and its temperature at the disappearance of the last crystal is determined. The test is then repeated

with very slow warming as the indicated dissolution temperature is approached.

When the "salting-out" temperature is obtained by this method, there is no possibility of salt deposition above this temperature. Slightly below this temperature, only incipient crystal formation is possible. Crystallization increases progressively as the temperature is lowered further and only at much lower temperatures will the Solution freeze solid.

Temperatures Change Slowly

Solution temperatures actually respond very slowly to changes in atmospheric temperature. Tank-car quantities of Solution must be exposed to low atmospheric temperatures for considerable periods of time before the Solution temperature will drop to atmospheric temperature.

The amount of solids that crystallize are in proportion to the temperature drop below the saturation point, and crystals dropping out of solution lower the "salting-out" point of the remaining liquid.

Openings in spray pipes and lines in the fertilizer plant are usually of sufficient size to enable Solutions carrying small amounts of crystals to flow without difficulty.

The table below shows the amount of salt which will separate from two **NITRANA® Solutions** at various temperatures below the "salting-out" point.

In practice, Solutions are often successfully handled and tank cars are completely unloaded, when atmospheric temperatures are considerably below "salting-out" temperatures. In such cases, it is important to avoid allowing Solutions to remain stagnant in pipe lines and

equipment for a prolonged period. If there is to be a delay in operation, the system should be purged immediately.

Ten Helpful Suggestions

The following suggestions will assist you in more efficient handling of **NITRANA®, URANA®,** and **U-A-S® Solutions** during cold weather:

1. Use shortest feed lines practicable. Eliminate unnecessary bends and constrictions. Install enough union-connections for convenient dismantling of lines for cleaning. Install tees or crosses instead of ells at bends to permit cleaning with rods or stiff wires. The branches of tees should be upward. There should be no sags or dips in the line.
2. Use only diaphragm-type valves.
3. When supply pipes are cold, do not introduce solution until mixing machinery has been started and the first charge of superphosphate is actually in the mixer. Then try to keep solution moving with a minimum of delay between charges. If for any reason delay is anticipated, blow the solution out of the measuring tank and out of pipe lines. Equipment should be arranged for blowing the solution back into the tank car or the storage tank.
4. When atmospheric temperatures are expected to be below "salting-out" point, do not transfer solution to storage tanks but use directly from tank car. Ammoniating Solutions are loaded hot and Nitrogen Division tank cars are well insulated.
5. Unless necessary, do not vent air from tank car until unloading is completed, since this is a cooling action.
6. After mixing operations have stopped and lines are cleared of solution, disconnect feed lines at tank car. This will avoid the filling of the piping through any leak in the shut-off valve.
7. Equip solution lines with water connection for cleaning. If warm water is available, use this for cleaning and also to warm up feed lines and tank car valves before introducing solution. Completely plugged lines should be opened sufficiently by rodding to permit some water to be forced through in order to speed solution of the salt.
8. It is advisable to have gauge glasses and connections of at least 1/2-inch size.
9. Keep gauge glasses and gauge glass connections warm with electric heating devices or with electric lights. Infra lamps prove quite effective.
10. Insulate pipe lines wherever practical. Use the best insulation obtainable—but even dry burlap is better than no insulation.

APPROXIMATE POUNDS OF SOLID SALT FROM 100 POUNDS SOLUTION WHEN COOLED BELOW THE SOLUTION "SALTING-OUT" TEMPERATURE

SOLUTION	SALTING OUT TEMPERATURE	DEGREES BELOW "SALTING-OUT" POINT			
		5°F	10°F	15°F	20°F
NITRANA 4	56°F	2 lbs.	6 lbs.	8 lbs.	10 lbs.
NITRANA 4M	61°F	2 lbs.	5 lbs.	7 lbs.	9 lbs.

HERE'S THE BIG LINE OF

Arcadian®

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES			
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6	42.0	19.5	66.3	6.0	8.2	9.3	1.178	10	34
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	-7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

**Other ARCADIAN® Products: N-dure® • UREA 45 • A-N-L® Nitrogen Fertilizer
Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia**

NITROGEN DIVISION

MAIN OFFICE: 40 RECTOR ST., NEW YORK 6, N. Y., PHONE HANOVER 2-7300

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Chemical**

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Ironton, Ohio, P. O. Box 98
Omaha 7, Neb., P. O. Box 166
Raleigh, N. C., 16 W. Martin St.

Cedar 9-6301
Drexel 7-4366
Bellevue 1464
Temple 3-2801

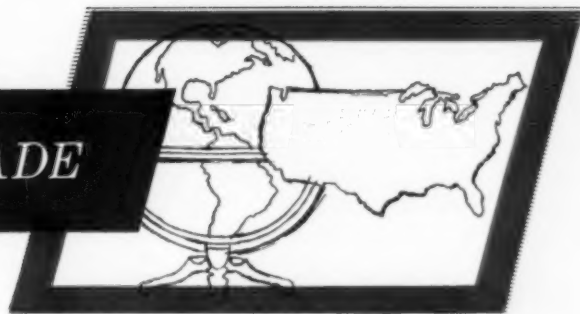
Columbia 1, S. C., 1203 Gervais St.
Atlanta 3, Ga., 127 Peachtree St., N. E.
Memphis 9, Tenn., 1929-B South 3rd St.
Columbia, Mo., 1134 Highway 40W

Alpine 3-6676
Jackson 2-7805
Whitehall 8-2692
Gibson 2-4040

Indianapolis 20, Ind., 6060 College Ave.
Kalamazoo, Mich., P. O. Box 869
St. Paul 14, Minn., 764 Vandalia St.
San Francisco 4, Cal., 235 Montgomery St.

Clifford 5-5443
Kalamazoo 5-8676
Midway 5-9141
Yukon 2-6840

NEWS about the TRADE



Heads Agrico Production

R. M. Richey has been named general superintendent of fertilizer production for the American Agricultural Chemicals Co., New York. He formerly was western division superintendent.

R. E. Lehmkuhl, formerly production superintendent for the Danville, Ill., and Seymour, Ind., Agrico plants, has been named to replace Mr. Richey as western division superintendent.

O'M Elkton Plant to Thiokol

Olin Mathieson Chemical Corp., Baltimore, sold their Elkton, Maryland plant to Thiokol Co., New York, late last month.

Mexicans Elect Schack Pres.

At the annual meeting of the Mexican insecticide and fertilizer manufacturers, J. L. Schack of Diamond Black Leaf de Mexico, was elected president. The meeting was held Nov. 12-15 at Veracruz.

Other officers elected were: vice president, R. Saurez, Products DDT; secretary, L. Gallardo, Shell de Mexico; and S. Dominguez, Agencies Newell.

Assistant To PCA President

Houston N. Clark has been appointed assistant to the president of the Potash Company of America, Carlsbad, N. Mex.

He joined the company in 1941 and has served as derivative plant supervisor, researcher, chemical plant foreman, refinery section supervisor, and assistant refinery superintendent. Since August 1956, Mr. Clark has been general super-

intendent of PCA's Carlsbad and Dumas, Texas, plants.

Clark Elected MGK President

Carroll A. Clark was elected president of McLaughlin Gormley King Co., Minneapolis, at a meeting of the board of directors held on November 18th. George A. McLaughlin, former president, was advanced to the position of chairman of the board. While continuing as chief executive officer and treasurer of the 56-year old firm, Mr. McLaughlin expects to have more time in his new post to devote to other interests.

The active management of all phases of company operations will be under the direction of Mr. Clark, who was employed by McLaughlin Gormley King Co. as a chemical engineer in 1932 and who has been vice president and general manager since 1947. He will continue as president of the wholly owned subsidiary company, McLaughlin Farm Chemicals, Inc.

ICM Consolidates Divs.

International Minerals & Chemical Corp., Chicago, announced November 24th that they have put into effect a consolidation program, which brings the phosphate chemicals and phosphate minerals division into a single phosphate unit. George W. Moyers head of the new phosphate division, and I Milton LeBaron will direct the newly created staff.

H. F. Roderick who has headed the phosphate chemicals division has resigned to become vice president and director of Miles Laboratory, Elkhart, Ind., and president of its new chemical division. W. Bellano, formerly in charge of IMC's engineering division, was recently elected president of Gulf Sulphur Corp.

Fairfield Acquires "Powco"

Fairfield Chemical Div., FMC, New York, have acquired from Olin-Mathieson Chemical Corp., Baltimore, all the inventories of "Powco" pesticide concentrates. Fairfield have also acquired rights to the "Powco" brand name.

TVA Discontinues 48% Fert.

TVA has discontinued making fertilizer containing 48% plant nutrients, and is engaged in perfecting a process for the manufacture of a new superphosphate of 54% concentration.

TVA fertilizer prices and sales policy were mentioned at the Fertilizer Industry Round Table (see story on page 33).

Brant Is Sunland Manager

Ralph L. Brant has been named general manager of Sunland Industries, Inc., Fresno, Calif. He succeeds the late Frank A. Easton.

Sunland maintains distributing points throughout most of Northern California.

FTC Hits Green Plasma Ads

The Federal Trade Commission last month charged I. G. Chemical Corp., New York, with misrepresenting the quality of "Green Plasma", a chemical preparation for grass. The complaint charges that the firm has violated the FTC Act by falsely advertising this product.

Among the charges, the FTC said that the product does not contain sufficient nutrients to be a plant food or fertilizer, as claimed, and does not bring back the original color of grass. According to

what's your * E.Q.?

QUESTIONS

True False

1. Inorganic salts are frequently added to oil-water systems to break emulsions. ☐ ☐
2. It is impossible to prepare practical emulsions in which the aqueous phase contains high concentrations of inorganic salts. ☐ ☐
3. Good agricultural emulsifiers may be characterized as individual specific chemical compounds. ☐ ☐
4. The anionic components of an agricultural emulsifier impart improved performance in soft water. ☐ ☐
5. A good emulsifier can be fully characterized by the ratio of anionic to nonionic components. ☐ ☐
6. The active ingredient content of an emulsifier is the chief criterion of its efficiency. ☐ ☐
7. Variations in toxicant, solvent and waters require adjustments in emulsifier blend for optimum performance. ☐ ☐
8. The ratio of the emulsifiers in a matched pair need not be altered when the concentrate is used at high or low dilution rates. ☐ ☐
9. In general, it is safer to formulate slightly higher on the nonionic side than on the anionic side when employing matched pairs. ☐ ☐
10. Most formulators use the correct amount of emulsifier in their emulsifiable concentrates. ☐ ☐

*Emulsifier Quality

ANSWERS

1. True. Most emulsifiers "salt out" in the presence of inorganic salts which impairs their function and breaks the emulsion.
2. False. Emcols H-A, H-B and H-C are used to emulsify insecticides in concentrated mixed fertilizer solutions in which the salt concentration may approach saturation. These emulsifiers have a unique tolerance to high salt concentrations.
3. False. Most efficient agricultural emulsifiers are blends of several anionic and nonionic surfactants.
4. True, if properly balanced with non-ionic components. Conversely, the nonionic components of such an emulsifier impart improved performance in hard water.
5. False. It is not sufficient to balance the anionic-nonionic ratio. Since both anionic and nonionic components have hydrophilic and lipophilic properties, each in turn must be properly balanced to obtain maximum efficiency at the minimum use level. This requires blending several components, in some cases as many as 12 different surfactants.
6. False. The composition of the separate components and their balance is the prime consideration.
7. True. This is achieved most conveniently by the use of matched pairs of emulsifiers.
8. False. The rate of dilution required by the particular field application affects the blend of the matched pair necessary for optimum performance.
9. True. An excess of nonionic may result in excessive creaming which can easily be redispersed, but an excess of anionic may result in a tendency toward oil separation.
10. Only you can answer this. If you are using Emcols, you are saving money because they can be used at low use levels and give outstanding aging stability. Low moisture content, the rigidly controlled components, and Emcol know-how allow you to manufacture superior concentrates at competitive prices.

SCORING: If most of your answers were correct, you definitely have emulsifier "know-how". And most formulators with "know-how" look to Emulsol for leadership in the field of emulsifiers for the pesticide industry. This leadership is based on continued **research** into new problems which arise such as liquid-pesticide, liquid fertilizer formulations . . . on rigid **control of production** by an outstanding staff of chemists . . . on **technical service** to help you with your particular problems.

Send for Emulsol's new Manual on "Pesticide Formulation", Dept. AC-12

EMULSOL
CHEMICAL CORPORATION

75 East Wacker Drive, Chicago 1, Illinois



division of WITCO CHEMICAL COMPANY, Inc.

AGRICULTURAL CHEMICALS

the complaint, the firm falsely claims that this product is a new scientific discovery which keeps lawns green 365 days a year with only occasional sprinklings.

NE Weed Conf. Program

Promising new developments in weed control, weed surveys, new chemicals for weed control, mode of action of herbicides,—are among the topics to be discussed at the annual meeting of the Northeastern Weed Control Conference, to be held January 7, 8, 9 at the Hotel New Yorker, New York City.

Officers of the 1959 conference are: president, S. N. Fertig, Cornell University; vice-president L. G. Utter, Diamond Alkali Co.; secretary-treasurer D. A. Schallock, Rutgers University.

Committee chairmen are: program, P. Santelmann, University of Maryland; Co-ordinating Committee, M. M. Schreiber, ARS, USDA, Cornell University; Sustaining Membership, L. D. Southwick, Dow Chemical Co.; Public Relations, E. R. Marshall, Carbide & Carbon Chemical Co.; and Awards, C. L. Hovey, Eastern States Farmers' Exchange.

ESA Meets in Baltimore

Pest control problems of the eastern states were the main topic of discussion at the thirtieth annual meeting of the Eastern Branch Entomological Society of America, held November 24, 25 at the Lord Baltimore Hotel, Baltimore, Md.

Opening remarks were made by R. L. Metcalf, ESA president, followed by R. H. Nelson, ESA executive secretary. Presiding at various sessions were Neely Turner, eastern chairman; R. I. Sailer, eastern vice chairman; C. L. Hovey and E. J. Duda, Program Committee.

Reports at the 2-day meeting concerned problems in the shade tree and ornamental field; insecticidal control of insects infesting fruits and vegetables; a review of recent experiments in pest control, and valuation of new pest control materials.

Ruedrich Joins Colloidal

Paul M. Ruedrich has joined the Colloidal Products Corp., Sausalito, Calif., as research director. Mr. Ruedrich spent twenty years as a research chemist with the Tidewater Associated Oil Company and 15 years as chemical director for the Griffin Chemical Co. of San Francisco.



A member of the Engineering Society's personnel service, Mr. Ruedrich is a past chairman of the Northern California section of Lubricating Engineering and a former chairman of the San Francisco section of the American Chemical Society.

NAC Facts Booklet

Publication of the *Open Door to Plenty*—the facts book of the pesticide industry—has recently been announced by the National Agricultural Chemicals Association.

Open Door to Plenty tells the story of agricultural chemicals and how they are used to protect food, property, and health. The 64 page illustrated booklet reviews progress which has been made in improving man's mastery over pests of all types and reports on future benefits that can be expected as research and education are continued in this vital field of human endeavor.

Single copies can be obtained free of charge by writing National Agricultural Chemicals Association, 1145 Nineteenth Street, N. W., Washington 6, D. C.

Alabama Pest Control Conf.

The Alabama Association for Control of Economic Pests, Auburn, and the Agricultural Experiment Station of the Alabama Polytechnic Institute are sponsoring a pest control conference on the campus at Auburn, Feb. 24 and 25.

Calspray Names Two

The California Spray-Chemical Corp., Richmond, Calif., has announced two personnel appointments. Claude T. Davis has been named assistant to the manager of the Southern region and will

assist in the development of sales policies, procedures, and programs for the Southeast. He has been with Calspray for 12 years.

James P. Toffaleti has been named technical director for the firm's French subsidiary, California Spray-Chemical Compagnie Française. His offices are in Paris. Mr. Toffaleti previously was district manager for the South Central United States.

Audubon Soc. Concerned

Continuing its campaign against pesticides, several speakers at the recent meeting of the National Audubon Society in New York City in mid-November, expressed concern over the "lethal effect" of modern insecticides on wildlife. As one speaker observed, unless aerial spray programs are discontinued "we shall have been witnesses, within a single decade, to a greater extermination of animal life than in all the previous years of man's history on earth."

Spencer Prilling Tower

This all-aluminum prilling tower will produce solid urea at Spencer Chemical Company's Henderson Works. The tower is the final unit of a 100-ton-per-day urea plant which has been under construction for the past year. Currently, the urea synthesis section of the new plant is "on stream" producing solutions for mixed fertilizer and direct application. Company officials estimate that the prilling towers will be put into operation sometime during the latter part of this month. In addition to the standard 80-pound paper bags, the new Spencer product will be available in the waterproof, 50-pound polyethylene bags (inset) which were introduced by the company earlier this fall.





*T.M. Reg. App'd For

Big Dave establishes a new standard in mixing Triples!

Davison's new Hi-Flo Run-O-Pile Triple flows better because it contains less dust. It's easier to handle, cuts unloading costs, and increases your production efficiency. It represents a *real advancement* in mixing Triples.

Hi-Flo Run-O-Pile Triple Superphosphate, made only by Davison, has high capacity for absorption of ammonia in processing either granulated or powdered mixed fertilizers because of its porosity, friability and constant 46/47% P_2O_5 content. It has proven satisfactory for granulating in several different types of granulating equip-

ment. Hi-Flo Run-O-Pile has passed all tests it's been put to in batch and continuous ammoniators. It helps you produce low-cost formulas.

You will like to work with non-dusting Hi-Flo Run-O-Pile Triple. Big Dave says, "We can ship now. Let's talk it over."

W.R. GRACE & CO.
DAVISON CHEMICAL DIVISION
BALTIMORE 3, MARYLAND



Cotton Conf. Dec. 17-18

Efforts of the cotton industry to combat the boll weevil and other insects will be outlined at the Beltwide Cotton Production Conference to be held December 17-18 at the Rice Hotel, Houston, Tex. The conference is being sponsored by the National Cotton Council in cooperation with farm organizations, Cotton Belt land-grant colleges, the agricultural chemicals industry, U.S. Department of Agriculture and other groups.

The impact of the boll weevil on cotton production costs will be described by Robert R. Coker, president of Coker's Pedigreed Seed Co., Hartsville, S.C. As the lead-off speaker on the subject of cotton insects, he will detail the cost of controlling the boll weevil, as well as the damage caused by loss in yield and quality. The need of greatly expanded research to attain more effective and lower cost control will be outlined.

Some of the new approaches to controlling cotton insects in the future will be described by Dr. T. B. Davich, entomologist at the Texas Experiment Station, College Station. Emphasis will be placed on insect control approaches that hold promise of being more effective and lower in cost.

New recommendations for controlling insects next year will be given by Dr. M. E. Merkl, entomologist at the Delta Branch Experiment Station, Stoneville, Miss. The recommendations will be essentially a summary of the insect control changes agreed upon by the Cotton Insect Research and Control Conference.

California Weed Conference

400 delegates are expected to attend the eleventh annual California Weed Conference in Santa Barbara, January 20, 21 and 22. Conference sessions will be held at the Miramar Hotel Auditorium. The public is invited to attend.

Attending the meeting will be farmers, nurserymen, floriculturists, farm advisors, county agricultural commissioners, state and federal

weed workers, county highway commissioners, representatives of chemical companies manufacturing weed control products, greenkeepers, farm editors, broadcasters, agricultural students and others.

NW Plant Food Meeting

A fertilizer solutions symposium featured the Pacific Northwest Plant Food meeting held in Gearhart, Oregon, Oct. 23 and 24. Haven Lewitt, Shell Chemical Co., spoke on anhydrous ammonia and Bud Lockhardt discussed aqua ammonia.

Other subjects covered at the meeting were ammonium bisulfite, phosphoric acid, potash, ammonium nitrate, and new developments in fertilizer solutions.

Heads British Group

J. T. Procter, Anderson-Richardson Fertilizers Ltd., York, England, has been elected president of the Fertilizer Manufacturers' Association for 1958-59. Vice president is H. G. Rope, Fisons Ltd., London.

Fertilizer Purchase Survey

Almost 40 per cent of all United States commercial farmers feel that they should have used greater amounts of fertilizer in 1958 than they actually did, according to a recent survey of the Countrywide Farm Panel of Doane Agricultural Service, Inc., St. Louis, Mo.

The panel is comprised of a representative sample of commercial farmers with annual incomes over \$2,500. Questions were asked to determine farmers' attitudes toward the value of fertilizer, brand preference, and factors of influence on fertilizer purchases. Only 3.5 per cent of the farmers said they should have used less fertilizer on their 1958 crops. More than 39 per cent said they should have used more fertilizer and 51.2 said they should have used the same amount they did in 1957.

Eighty-one per cent of the

Bunker Hill Co. Selects Site

The Bunker Hill Co., Spokane, Wash., has taken an option on property near Kennewick, Wash., for its proposed \$10 million fertilizer plant. The site is five miles down the Columbia River from Kennewick and is located between an Allied Chemical and Dye Co. plant and a new Phillips Pacific Chemical plant.

The Bunker Hill plant will have an annual capacity of 200,000 tons. The company will use its own sulfuric acid in making the fertilizer. The acid is a by-product of the Bunker Hill reduction plant at Kellogg, Wash.

Egypt Seeking Bids

The Egyptian Ministry of Public Health has called for bids for equipment for an insecticide plant. The equipment includes a pulverizing unit for production of powdered DDT, a unit for absorbing hydrogen chloride gas, and a three-ton crane. Bids are invited through local agents by Insecticide Plant, Ministry of Public Health, Kafr el Zayat, Egypt.

farmers reported the use of bagged fertilizer and only 8.2 per cent used bulk or liquid fertilizers. An additional 10.1 per cent used no commercial fertilizer at all.

There was little or no significant difference between the number of different brands purchased by region. There was a difference, however, in bagged vs. bulk and liquid in the various regions. The West North Central, East North Central, and Western regions showed a greater percentage of farmers using only liquid or bulk fertilizer. There also was a wide difference in fertilizer vs. no fertilizer by region. In the West North Central region almost 18 per cent of the farmers used no commercial fertilizer, while in the Western region this figure was over 20 per cent. On the other extreme, less than one per cent of farmers in the South Atlantic region used no commercial fertilizer.



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IN THE SOUTH

Operation "Big Test," a project to have soil tests made on every farm in the county, got underway in Scotland County, North Carolina, last month. The project is patterned after a similar project in Hoke County, N.C., and its aim is to get all of the county's farmers to follow the fertilizer and liming recommendations of North Carolina State College.

The Hoke County project resulted in an eleven per cent increase in fertilizer sales this year despite a 40 per cent reduction in cotton acreage—the county's most important fertilizer-using crop—and a downward trend in fertilizer consumption for the state as a whole. The Southeastern Regional Office of the National Plant Food Institute is assisting with both the Hoke and Scotland County programs.

The Scotland County Development Committee of the Laurinburg Chamber of Commerce is sponsoring the "Big Test." Co-chairmen of the drive are County Agent J. B. Caudill and W. M. Campbell, Dixie Guano Co. Advice and assistance is being provided by specialists from N.C. State College.

A group of fertilizer dealers and farmers of Robeson County, N.C., last month visited the State Soil Testing Laboratory at Raleigh. The trip was arranged by O. P. Owens, Robeson County agent, as part of the intensified soil fertility program in Robeson County.

Dr. E. J. Kamprath, of the soils testing laboratory, showed the visitors, step by step, how soil samples are handled. The group then visited the soils department at N.C. State College, where Dr. J. W. Fitts explained how research information developed by the agricultural experiment station is used by the soil testing laboratory in making lime and fertilizer recommendations. He emphasized the

importance of individual soil tests and explained that even many farmers who are using good soil management practices could increase their profits by using more fertilizer. Mr. Owens, Robeson County agent, estimates that if fertilizer and liming recommendations from the soil testing laboratory were to be followed by all Robeson County farmers, farm income in the county could be increased by \$1 million.

IN THE EAST

Many New York farmers in Chautauqua County will be working on their "Bachelor of Fertility" degrees this winter as part of operation "Ferti-Matic" which now is under way throughout the county.

The program is aimed at promoting the use of complete soil tests, and determining the pH and fertility levels in fields on every farm in Chautauqua County. The National Plant Food Institute, which initiated the project, is supporting the program through its Northeastern regional office, with a \$3,000 grant.

Principal objective of operation "Ferti-Matic" is to improve farm management practices through a sound lime and fertilization program and thereby increase farm income. Participating in the program are the New York Agricultural Extension Service, seed and fertilizer dealers, and several other groups, as well as the Institute.

The goal this Fall is to get every Chautauqua County farmer to participate in the program and to get soil samples from at least two 1959 crop fields on every farm. The long time goal of the program is to get soil tests on every dairy farm field at least once in every rotation and annually on intensive crop farms.

The curriculum for farmers who seek "Bachelor of Fertility" degrees requires eight credit hours of work. Three credit hours can be obtained by getting soil samples; two credit hours for attending the community "Ferti-Matic"

meeting; and three hours for doing homework which includes lessons on plant nutrients and lime, which will be issued through circular letters during the Winter.

The soil testing laboratory at Cornell University will analyze samples submitted by Chautauqua County farmers.

IN THE WEST

The Southwest accident prevention school for fertilizer plant supervisory personnel was held in Austin, Texas, Nov. 13 and 14. The school was sponsored by the Fertilizer Section of the National Safety Council and the National Plant Food Institute. The fifth school in this series is being held Dec. 2 and 3 at the Hacienda Motel in Fresno, Calif., for the Far West.

Glen C. Peterson, University of Kansas Extension, was director of instruction for the Southwest school. Among the speakers were: G. C. Peterson, University of Kansas Extension; John Gallagher, Fertilizer Section, National Safety Council; and A. I. Raney, Phillips Chemical Co.

O. J. Chinnock of the Hercules Powder Co. is director of the Far West school. A. C. Blackman, chief of the Division of Industrial Safety for the State of California, will discuss fundamentals of accident prevention, and Kirk Collins, Safety Consultant, City of Oakland, will list personal factors in safety. The foreman's safety job for all line management and supervisory people will be outlined by John E. Smith, director of Safety, Spencer Chemical Co.

Paul Palmer of Port Ludlow, Wash., is cooperating with the National Plant Food Institute on a small scale forest fertilization program. Mr. Palmer set aside an acre of Douglas fir to receive 160 pounds of nitrogen and 80 pounds of phosphoric acid per acre to demonstrate the possible need of a high fertility program in conjunction with modern forestry management techniques. Growth measurements will be made on the trees.

National Fertilizer Solutions Association Elects Ohnstad President to Succeed Cecil

THE National Fertilizer Solutions Association elected six new directors at its annual convention in Cincinnati, Ohio, November 16 to 18. The organization has been broken down into 12 districts and directors are chosen from both liquid fertilizer manufacturers and makers of equipment.

The new directors are: Hube Johnson, Mc-Jon Fertilizers, Oxford, Iowa, district No. 1; Dean R. McHard, Kaw Fertilizer Service, Lawrence, Kans., district No. 2; Edward A. Weitz, Badgerland Liquid Fertilizer Co., Milwaukee, district No. 3; Donald J. Humphrey, Flo-Lizer Co., Kingston, Ohio, district No. 5; August I. Balzer, Ok-Tex Fertilizers, Lubbock, Texas, district 10; and Joe Gillespie, Standard Steel Co., Indianapolis, Ind., director at large.

O. L. Ohnstad, Ohio Liquid Fertilizer Co., South Solon, Ohio, was elected president of the organization for 1959, succeeding Richard Cecil.

In his address at the convention, Mr. Cecil traced the history of the association and reported that the group has gained 68 new members since last year and is still growing. He said that of 300 plants in the country producing liquid fertilizers, 200 are members of the National Fertilizer Solutions Association. He added that, although it takes a while for a young organization to get its feet on the ground, the NFSA is starting to "get things done."

Professor George M. Beale and Professor Joseph Bohlen of Iowa State University, Ames, Iowa, appeared at the meeting to present their study of how farm people accept new ideas and problems. They said that 40 different research projects are included in the report and research still is being carried on.

The study is an attempt to determine how farmers receive in-

formation about new developments in agriculture and the creditability farmers tend to place on their various sources of information. Among the different influences on farmers are formal groups and organizations to which he belongs and informal groups and organizations. Professor Beale and Dr. Bohlen, with the aid of a huge flannel board, outlined the five stages the farmer seems to go through before deciding to adopt a new procedure. The stages are: awareness, in which the farmer knows vaguely about a new product; information stage, in which his interest has developed and he seeks more information; the evaluation stage, when a farmer weighs the alternatives to adopting a new procedure; the trial stage when it is adopted on a small scale; and the adoption stage, in which the farmer adopts the new process for full-scale and continued use. The time limit for these stages can take from five to fifteen years, the professors said.

Types of change referred to in this report include new materials or equipment, improved practices, innovations, and new enterprises on the part of the farmer, such as shifting from raising vegetables to raising cattle.

The kinds of people who adopt new practices are divided into innovators, early adopters, early majority, majority, and non-adopters. The report also breaks down the sources of information to include mass media, government agencies, neighbors and friends, and representatives of commercial firms. An interesting point made here was that the farther you get away from the date an innovation is put on the market, the more people depend on the advice of neighbors and friends as to its worth.

It was brought out during the presentation that 54 per cent of the farmers interviewed in one area

were convinced that they are using all the fertilizer they should. Professor Beale and Dr. Bohlen said that the fertilizer standards of farmers have to be raised before they can be sold more fertilizer. They said that salesmen who incorporate themselves in a community and actually are farmers in their territory will have a much better record of selling fertilizer than the so-called travelling man. They also said that the average dealer spends less than seven per cent of his time selling fertilizer and doesn't know what to do with soil test analyses and crop recommendations. "If you can get a salesman," they told the association, "who knows fertilizer, to become a member of the community who will program fertilizer instead of just sell fertilizer, your fertilizer business will increase."

E. E. Crouse of E. E. Crouse Soil Service, Liberty, Indiana, executive vice president of the association, said that farm income is running 19 per cent higher than it was in 1947 and pointed to better growing methods as being responsible. He said that this year crops are nine per cent better than they ever were before. Mr. Cecil told the meeting that the NFSA will continue to grow as long as it and its members try to do the best possible job for the farmer.

The fertilizer industry is becoming increasingly essential to the national welfare, according to Dr. Samuel N. Stevens, president of Stevens, Thurrow and Associates, Chicago. He said that the American farmer has, for the most part, mined the soil and not bothered to put back into it nutrients which are lost. Dr. Stevens said the fertilizer industry has educational, technological and marketing jobs to do. More research has to be carried on, he said, before we know how to produce the optimum amount from the soil.

At the present time, he pointed out, it is to the national interest to restrict acreage. By recovering for the soil its annual fertility, however, he continued, we

can progressively increase yields per acre.

Scott Hall, inspector, Department of Biochemistry, Purdue University, Lafayette, Ind., gave a demonstration at the meeting of how they sample liquid fertilizers under pressure in Indiana and recommended his method for consideration by NFSA as the official sampling method.

A panel discussion of the convention's theme, "Planning for Profits," was moderated by E. E. Crouse. Speaking of production equipment, William W. Arnold, Allied Chemical Corp., cautioned the members not to buy equipment solely on the basis of initial cost but to consider the upkeep and maintenance costs. He said that liquid fertilizer production equipment is continually exposed to corrosive chemicals and that manufacturers should keep up with advances in equipment and corrosion-resistant compounds.

F. M. Chester, vice president of Schelm Brothers, Inc., East Peoria, Ill., spoke on application equipment and said that it, too, should be purchased with an eye towards upkeep costs. Initial expense is an important factor, he said, but it should not be the determining factor. Mr. Chester named two things that are holding back the liquid fertilizer industry. He said that the customers are confused by the presence of too many "experts" and he believes the industry should make available a "super-market" of service to satisfy the customer's every need and to show him that the liquid operator is an efficient businessman. Mr. Chester called for teamwork between the manufacturers of applying equipment and the manufacturers of liquid fertilizers if the industry is going to succeed.

Stewart D. Daniels, Monsanto Chemical Co., spoke on production and inventory control and said that controls are tough and tedious but without them a plant operator might find that he has lost money at the end of a year that appeared

to be a good one. For example, he said that a plant making 3,000 tons of 8-8-8 could lose \$6,000 if, by a slight miscalculation, the product actually was 8½-8½-8. By the same token, he said, if the product is under-analysis, the operator stands to lose customers. Mr. Daniels said that it is advisable to know at all times exactly how much materials are on hand. To carry a 500 ton inventory for six months, he pointed out, costs \$500. Running out of chemicals also can be costly in the growing season.

The panel member speaking on Standardization, Donald R. Weber of Spraying Systems Co., Bellwood, Ill., reported that there is a complete lack of uniformity in the entire industry. He said that inlets on tanks, for example, vary from ½ inch to 12 inches in size. Materials out of which tanks are constructed also vary widely and there are all kinds, shapes, sizes, and varieties of gauges in use.

Mr. Weber said that there does not seem to be effort by the chemical manufacturers to experiment with new chemicals in an effort to determine the materials that will best hold them without corroding.

6th Meeting of ESA in Utah

More than 300 technical reports are being given December 1-4 at the sixth annual meeting of the entomological Society of America at the Hotel Utah, Salt Lake City, Utah. As in previous years, discussions for the meeting are classed into separate groups, dealing with: general entomology, chemical control investigations, medical and veterinary entomology, biology, physiology and toxicology.

A new feature of the annual meeting is a photographic salon of selected photographs, slides and motion pictures.

Officers of the 1958 meeting are: R. L. Metcalf, president; P. W. Oman, president-elect; and R. H. Nelson, executive secretary. L. D. Anderson, chairman of the program committee; G. F. Knowlton, chairman local arrangements committee.

Dr. Weed Joins Fairfield

Dr. Alfred Weed who until recently has been in charge of household insecticide sales for the insecticide products department of Olin-Mathieson Chemical Corp., Baltimore, has just joined Fairfield Chemicals, Food Machinery & Chemical Corp., New York. He will act as consultant and special assistant to John Rodda, manager of Fairfield operations.

Dr. Weed's experience in the insecticide industry has spanned over thirty-five years. He was originally technical director of John Powell & Co., and was one of a group of Powell employees who acquired the business when it was sold by Mr. Powell seven or eight years ago, and who later disposed of their interest in the company to Olin-Mathieson. Dr. Weed presently makes his home in Asheville, N. C. He will continue to headquarter there, but will travel as needed in the interest of Fairfield, specializing in sale and servicing of some of the "Powco" specialties which he has handled for Olin-Mathieson.

Stauffer Changes in Henderson

Arthur T. Newell, manager of the Henderson (Nevada) Works of Stauffer Chemical Company, is retiring January 1, 1959. Mr. Newell will continue to serve the company in consulting capacity, acting as advisor to the Henderson works manager. James F. Orr has been appointed to succeed Mr. Newell as works manager and Leonard J. Edwards has been appointed assistant works manager.

Arizona Ammonia Plant

Construction of a 60 ton per day anhydrous ammonia plant in Arizona was announced jointly by Southwestern Agrochemical Corp., Chandler, Ariz. and First Mississippi Corp., Yazoo City, Miss.

A new Arizona chemical company will be formed by the two participating corporations to own and operate the new facility, which plant will be located in Chandler, Ariz. and cost about four million.

A contract for the plant has been placed with Chemical Construction Corp., New York City, which is currently designing the plant, and will begin construction early in 1959.

The announcement was made by C. P. Gould, president of Southwestern Agrochemical and O. Cooper, chairman of the Board of the Mississippi Corp.



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reports Don Peterson, General Manager,
Ashkum Fertilizer Company, Ashkum, Illinois

"THE fertilizer business pays off on new ideas, and that's just the reason we're sold on International's Full Orbit Service," reports Don Peterson, General Manager of the Ashkum Fertilizer Company, Ashkum, Ill.

"For example, it has already aided in our regular program of market studies. Also, we'll hold a lot of promotional meetings this winter, and we'll be using a lot of Full Orbit meeting ideas," adds Peterson. "We've already found the book, 'Making Promotion Dollars Pay Off' comes in handy as a reference in planning next Spring's advertising program."

"In fact, every one of the Full Orbit Service books is aimed right at problems that concern us... and every one else in the fertilizer business. That's why the new ideas in Full Orbit Service are helping us re-evaluate our total program one step at a time."

Such remarks are typical of the comments from manufacturers who are putting Full Orbit Service to work. They, too, have learned that this new concept of service from International Minerals lays a solid foundation for step-by-step progress.

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ket facts you need for planning a sound merchandising program... gives you yardsticks to measure past performance, future potential... and practical marketing goals for today.

• **FULL ORBIT SERVICE** helps you determine whether your selling effort needs more men for sales... or more sales per man. It provides ideas to use in selecting, training and supervising a hard-hitting sales staff.

• **FULL ORBIT SERVICE** outlines steps for planning meetings that arouse life, fire up salesmen and dealers... excite prospective customers.

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If you have any questions about International's Full Orbit Service... and the way it can help you sell more fertilizer profitably... contact your International Minerals representative.

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FULL ORBIT OUTLINED THE STEPS FOR US —

International Minerals program is a basic and concrete approach to manufacturing and merchandising, report Abbott (left) and General Manager Don Peterson. We believe the folks in our industry will welcome sound ideas. Surely Full Orbit will help our "Bumper Crop" program.



BLUE PRINT FOR ACTION —

"Full Orbit Service represents progress just as our expansion represents progress," explains Peterson, shown at right with builder Ralph W. Whaley. Although the Ashkum Fertilizer Plant was built just five years ago, the company is steadily expanding its facilities. The new office building provides 2,000 feet of office space.

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N. P. F. I. Releases Regional Comparison of Farmers' Attitudes Toward Fertilizer Use

THE National Plant Food Institute has just released a compilation prepared by its chief agronomist, W. H. Garman, reviewing "Regional Differences in Farmers' Attitudes Toward the Use of Fertilizer." The findings were obtained in the study made for the institute by National Analysts, Inc., during the late summer of 1956. Five separate regional reports have been issued previously by the N.P.F.I., but this is the first time that figures from each of the five regions have been presented together, thus permitting a direct comparison of the differences in farmers' thinking from one region to another.

Mr. Garman's report consists of a series of tables, showing variation in fertilization practices and in thinking about fertilizers, from one region to another, and also contrasting the practices and attitudes between farmers who are classified as "high" users of fertilizer and those classified as "low" users. As might have been anticipated, the high level user of fertilizer in general has (1) a bigger investment in land and buildings, (2) a larger farm, (3) a more complex tenure arrangement, (4) is better educated, (5) makes more money, (6) is more business-like in his managerial approach to farming operations, and (7) is more conscious of economic and market conditions.

Those farmers who use less than the optimum amount of fertilizer generally look upon its use as a goal they would like to attain, and many say that they would borrow money to buy fertilizer. In general, they do not view the future of farming as improving, and few of them have plans for increasing their farm income over the next five years. Lack of money is an important reason in their failure

to use fertilizer, yet few of them take advantage of available credit.

A number of observations seem in order with reference to the farmers who use no fertilizer at all, or subnormal amounts.

(1) This farmer is confused by fertilizer terminology and does not always understand the meaning of grades.

(2) This farmer needs information from sources he will accept as being practical.

(3) He needs help to enable him to judge results from use of fertilizer.

(4) He needs a source of credit so he can finance fertilizer purchases.

(5) This farmer needs help in evaluating fertilizer in terms of dollar returns which can be anticipated.

(6) This farmer needs help in spreading the risk of fertilizer purchases. Since weather or other factors may intervene and diminish the return from fertilizer applications, such farmers may need credit on an actuarial basis.

(7) This farmer needs to be convinced that he can actually exercise effective control over forces which affect his livelihood and is not necessarily completely at the mercy of external influences such as weather and government.

The following data summarize information presented in some of the most significant of the tables in Mr. Garman's report.

A range from 48 to 91% was reported in percentage use of fertilizer by the farmers in the various areas, the figures being for farmers using any kind of fertilizer or manure on their most important crop: (N.E. 91%, S.E. 91%, N.C. 78%, W. 60%, and S.W. 48%).

Of those who used any kind of fertilizer, the following percentages

reported use of commercial fertilizer (1) on their most important crop (S.E. 93%, S.W. 79%, N. C. 69%, W. 66%, and N.E. 57%) and (2) on their second most important crop (S.E. 95%, S.W. 81%, N.E. 75%, N.C. 75%, and W. 74%).

Of those farmers who reported they had plans for increasing the financial return from their properties, only a small percentage listed increased fertilizer purchases as part of their plan. The figures follow: N.C. 29%, W. 20%, S.W. 19%, N.E. 10%, and S.E. 10%.

There seems to be a definite impression in the minds of many farmers that increased use of fertilizer might be accompanied by some hazard to crops. Of those farmers fertilizing their most important crop the following replies indicate their feeling as to the result to be anticipated: Effect would be bad (W. 66%, N.C. 62%, N.E. 61%, S.E. 42%, and S.W. 36%), good effect could be anticipated (S.W. 34%, N.E. 33%, S.E. 33%, N.C. 28% and W. 23%). Would depend on weather (S.W. 42%, S.E. 37%, N.E. 22%, N.C. 19% and W. 9%).

Of those *not* fertilizing their major crop there was a wide difference from one area to another as to their feeling as to whether fertilization (at a 500 lb. per acre rate) would be worthwhile or not. Ninety percent in the northeast anticipated a favorable result, but in the southwest, north central and west a high percentage of those farmers reporting said they would anticipate bad effects. The tabulations: good (N.E. 90%, S.E. 62%, W. 27%, N.C. 24%, and S.W. 13%) Bad (W. 58%, S.W. 54%, N.C. 48%, N.E. 7% and S.E. 6%).

In most geographical areas there were substantially more "high" users than "low" users of fertilizer who stated that they had, at one time or another, had a soil test made for a major crop. Totals were reported as follows: High users (N.E. 80%, W. 76%, S.E.

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72%, N.C. 68%, and S.W. 33%). Low users (W. 67%, N.C. 58%, S.E. 48%, S.W. 39% and N.E. 36%).

Of those who had soil tests made, from 52 to 60% followed the recommendations given, and another approximately 20% partially followed the recommendations. There were no particularly significant variations in the answers to this question from one geographical area to another.

The percent of farmers who reported discussing their most recent fertilizer purchase with someone ranged from 46 to 70%. (W. 70%, N.C. 63%, S.W. 59%, N.E. 55%, and S.E. 46%). Of those who discussed the matter with someone—the particular somebody broke down as follows: local dealer (N.C. 39%, W. 35%, N.E. 31%, S.E. 30% and S.W. 19%); neighbors or friends (N.C. 17%, W. 15%, S.W. 13%, S.E. 11%, and N.E. 9%); county agent (S.W. 31%, S.E. 24%, N.E. 18%, W. 13% and N.C. 12%).

Farmers rated the various sources of information on what fertilizer to purchase as follows: county agent (N.E. 77%, W. 77%, S.W. 75%, N.C. 70% and S.E. 70%); fertilizer dealer (N.C. 30%, N.E. 26%, S.E. 26%, S.W. 19%, and W. 18%); college publications (N.C. 41%, N.E. 40%, W. 40%, S.E. 32% and S.W. 31%).

Only a little over half of the farmers interviewed expressed themselves as completely satisfied with their results from fertilization in 1956. Very satisfied replies came from the following percentages (N.C. 59%, N.E. 49%, S.E. 49%, W. 48%, and S.W. 32%). Reports of partial satisfaction ranged from a low of 26% in the north central area up to 35% in the far west. Approximately twenty percent indicated they were "not satisfied," with the high figure here of 34% being reported from the southwest.

Reasons for not using commercial fertilizer included lack of money, preference for manure, un-

favorable weather and belief that fertilizer was not necessary. In this tabulation as in some others in the survey the number of replies exceeds 100%, as there were some multiple answers to the question. Lacked money (N.E. 50% S.W. 35%, S.E. 33%, N.C. 31% and W. 27%); not necessary (S.E. 40%, W. 38% N.E. 34%, N.C. 28%, and S.W. 25%); prefer manure (S.E. 33%, N.C. 24%, N.E. 19% W.

11%, and S. W. 10%); weather, etc. (S.W. 68%, N.C. 67%, W. 40%, N.E. 30% and S.E. 20%).

An average of about 40% of those farmers reporting in the survey indicated they would not borrow money to buy fertilizer. The replies were tabulated as follows: certainly would (S.E. 55%, N.C. 39%, N.E. 32%, W. 32% and S.W. 27%), probably would (N.E. 24%, N.C. 24% S.E. 22%, W. 22%, and

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S.W. 21%; most likely would not (S.W. 52%, W. 46%, N.E. 44%, N.C. 37% and S.E. 23%).

Assuming plenty of cash the following percentages of farmers reported they would use *more than* 450 lbs. of fertilizer per acre: high users (S.E. 55%, N.E. 54%, N.C. 40%, W. 31%, and S.W. none); low users (S.E. 32%, N.E. 32%, S.W. 10%, N.C. 8%, and W. 6%).

Ozoban For Smog Control

Ozoban, a new plant spray that is said to reduce crop losses from smog damage, now is being made available commercially in California by Chas. Pfizer & Co., Inc., New York.

Reported to be highly effective in University of California trials on vegetable crops and flowers, the new formulation is expected to have important application in Southern California where losses to smog run close to five million dollars a year.

A mixture of ascorbic acid and anhydrous potassium carbonate, Ozoban can be applied with standard spraying equipment.

Far West Safety School

The Far West Safety School for Accident Prevention in Fertilizer Plants is being held in Fresno, Calif., Dec. 2 and 3. It is being sponsored by the Fertilizer section of the National Safety Council in cooperation with the National Plant Food Institute.

The school offers plant supervisors a chance to look at hazards and methods of control of accidents in fertilizer plants, and provides the fundamentals of a workable accident prevention program.

Canada OK's Use of Sevin

Canadian agricultural authorities have approved a commercial label covering the use of Sevin insecticide for control of insects attacking apples and pears. Sevin is a product of Crag Agricultural Chemicals, Union Carbide Chemicals Co., Division of Union Carbide Corp., New York.



F. C. Johnson

R. O. Weiss

Metalsalts Management Shifts

Robert O. Weiss (right), formerly vice president in charge of production, has been named president of Metalsalts Corp., Hawthorne, N. J. He has been with the company since 1944.

At the same time, the company announced the appointment of Frank C. Johnson (left) as vice president in charge of sales. He had been sales manager. He joined Metalsalts in 1945.

During Mr. Weiss' association with Metalsalts, he directed the corporation's technical research program in the mercurial field that resulted in the development of several mercurial disinfectants for the agricultural industry.

Armour Starts Operations

Operations have been started at the new Armour fertilizer plant near Owosso, Mich. The plant is operated by the newly-formed Owosso Division of the Armour Fertilizer Works. L. L. Sparks is general manager.

Production of complete, granulated plant foods in various formulas is being stepped up progressively and the plant will be in full operation early next year. Fertilizers will be marketed under the Armour "Vertagreen," "Pebble," and "Big Crop" brands. First shipments in bags will be made in January.

USDA Clears Crag Repellent

Crag fly repellent has been cleared by the U. S. Department of Agriculture as an ingredient for livestock spray formulations on a "no residue" basis, according to the Union Carbide Chemicals Co., Division of Union Carbide Corp., New York.

The repellent can be used on both dairy and beef cattle. It is effective against horse flies, stable flies, horn flies, house flies, mosquitoes, and gnats. It is a synergist for pyrethrins and allethrin, and is said to improve the performance of residual toxicants. Union Carbide studies indicate that the re-

pellent is less toxic to warm-blooded animals than pyrethrins, piperonyl butoxide, methoxychlor, and petroleum distillate.

The clearance by the Department of Agriculture is based on extensive data submitted by the company and means that sprays formulated with Crag Fly Repellent will be acceptable for registration under The Federal Insecticide Act.

Railroads Propose Rate Cut

The Atlantic Coastline and Seaboard Air Line Railroads last month proposed a drastic reduction in freight rates on triple superphosphate from Florida to various territories, principally in the Midwest.

The proposal is the outcome of various meetings between carriers, consignees, and shippers of triple superphosphate to determine how the railroad could recapture business that was moving via barge from various Florida points to locations along the Mississippi, Ohio, and Missouri rivers and ultimately delivered by truck or rail to destinations at a much lower cost than the present rail rates. The carriers previously had suggested reducing rates to the river points only.

Escambia Names Three

Three new officers have been named by the Escambia Chemical Corp., New York. They are: John B. Clopton, vice president and director of sales; Albert E. New, vice president and director of production; and Dr. W. Mayo Smith, vice president and director of research.

Mr. Clopton, who was appointed director of sales in April, will continue to direct sales through the New York office. Mr. New joined Escambia in 1956 and has been technical director in the manufacturing division. Dr. Smith has been with the company since it was organized in 1954. He is located at Escambia's recently opened research center in Wilton, Conn.

AGRICULTURAL CHEMICALS

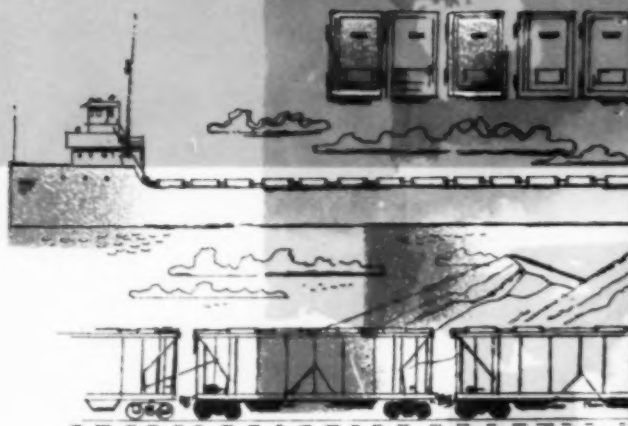
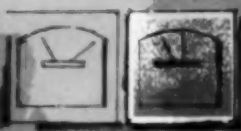


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These manufacturers report THE FIELD FACTS



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Green Belt Chemical Co.,
St. Paris, Ohio — Bryant, Indiana**

"We grew up with International Triple Super. Right from the start International worked with us to smooth out production and reduce costs."



**Mrs. Grace Keos Anderson,
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"In the many years we have used International, they never let us down."



**Archie Edwards, Manager,
Red Star Fertilizer Division,
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"Service is a mighty big reason we contract for International's Triple."



**A. C. Norris, President,
V. W. Norris & Son, Inc.,
Rushville, Indiana**

"We like International's Triple and the way they do business."



**George H. Alber, President,
Marion Plant Life Fertilizer Co.,
Marion, Ohio**

"We like the way it ammoniates . . . and the granulated product we get. It's high-grade phosphate, costs less per unit."



**J. Raymond Myers, Production Mgr.,
Fertilizer Dept., Eastern States
Farmers' Exchange, York, Pa.**

"International has proved that large shipments (by Allegheny) are practical. Shipments of Triple Super bring immediate savings in shipping costs."



**Damon Robinson, Manager,
Plant Food Division, Kelly-Weber
& Company, Inc., Lake Charles, La.**

"International's charter carpenter of Triple help us use our water life-line to best advantage."



**Alex Mooney, General Manager,
Fertilizer Division, Canada
Packers, Ltd., Toronto, Canada**

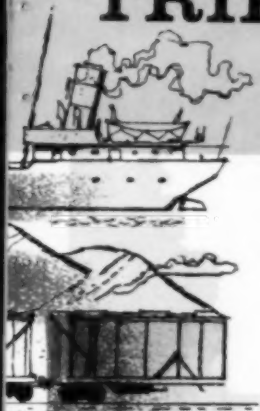
"Our first shipment of Triple worked fine . . . so have the rest. We're sold on ocean and lake-going vessel shipments. Comes through in fine condition."



**A. H. Roffers, Gen. Mgr. (left), and
W. E. Jones, Mgr., Fertilizer Div.,
Northwest Co-op Mills, Inc.,
St. Paul, Minnesota**

"Even after months of storage, your Triple crumbles like a cookie."

ON INTERNATIONAL'S TRIPLE SUPERPHOSPHATE...



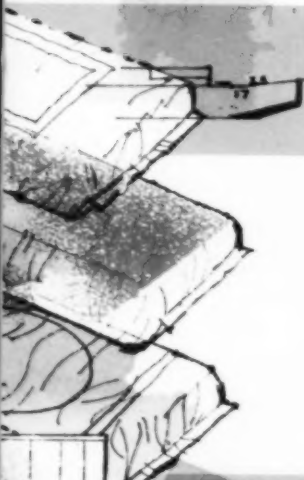
E. D. Kingsbury,
Kingsbury & Company, Inc.,
Indianapolis, Ind.

"We like the way International emphasizes research, develops new products, pioneers new approaches to shipping and technical service."



E. W. Liggett, General Manager,
Bartlett and O'Bryan Fertilizer Co.,
Owensboro, Ky.

"Good product . . . good service . . . good people — that's the reason I buy Triple Super from International."



Don Peterson, Ashkum Fertilizer Company,
Ashkum, Ill.

"International's Triple Super has earned its place in our plant. We can bank on its arriving in good physical condition for easy handling. We like the way the triple ammoniates."



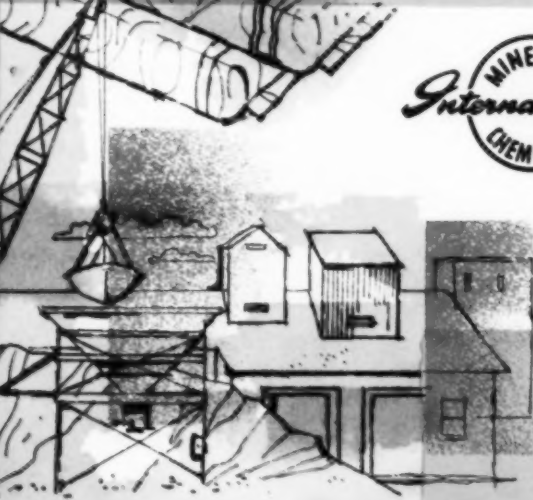
A. B. Chrisman, President,
A. B. Chrisman Fertilizer Company,
Meredosia, Ill.

"I like the Full Orbit program. It's already helped us solve some business problems — it's full of ideas and suggestions that we're putting to good use."



A. R. Mullin, Gen. Mgr., Fertilizer Div. Indiana Farm Bureau Co-op Assn.,
Indianapolis, Ind.

"International's Triple hits a consistent high in product quality and service."



W. R. Edgecomb, Treas.-Gen. Mgr.,
Areostock Hi-Test Fertilizer Company,
Presque Isle, Maine

"We learned by experience; our ammoniation rate proved that International's Triple had superior ammoniation qualities we were looking for."



Ralph Fraser, Vice President,
Summers Fertilizer Company,
Baltimore, Md.

"Pushing barge shipments up the Mississippi has meant immediate savings at our inland plants."

You can benefit...

from International's Triple Super Service
and proved dependable products

TRIPLE SUPERPHOSPHATE

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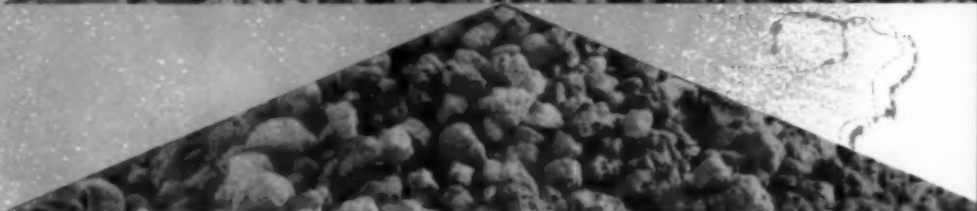
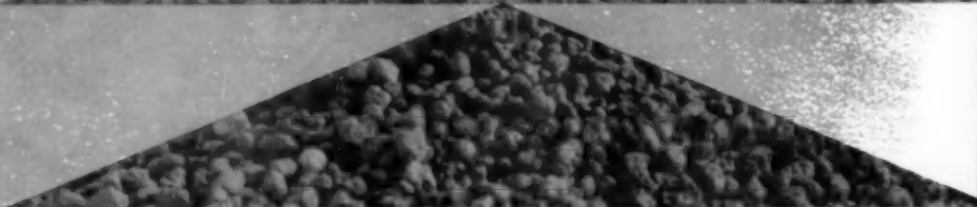
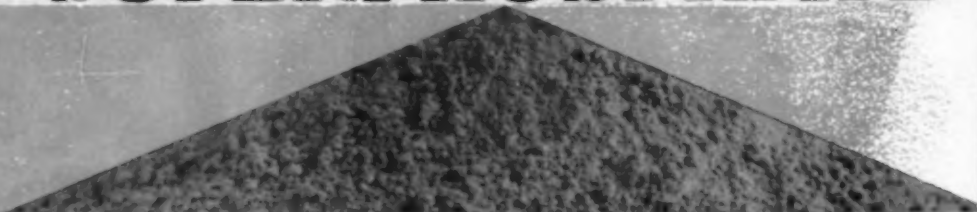
International's fine-textured Triple provides uniform particle size, even density and proper moisture level that lets you ammoniate at higher rates, temperatures.

COARSE

International's coarse-textured Triple gives same excellent ammoniation batch after batch... promotes desirable agglomeration.

GRANULAR

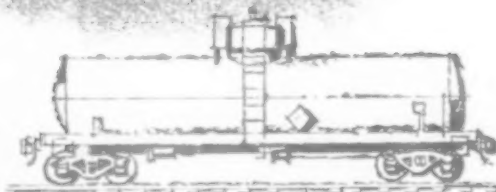
International's new granular Triple is non-crumbling, free-flowing; makes granulation easier. Sponge-like structure of granules facilitates ammoniation.



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Now you can make International your dependable single source of all high-analysis phosphate ingredients. International's high purity 53%-55% phosphoric acid comes direct to you in rubber-lined tank cars, shipped to meet your tightest schedules.

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PHOSPHATE CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center: Skokie, Illinois

Fertilizer Accident Frequency Rate Drops Sharply—But Severity Record Still Is Bad

By H. H. Slawson

FERTILIZER industry personnel who attended the annual meeting of the National Safety Council's fertilizer section in Chicago, Oct. 20-21, heard two sharply contrasting reports on the progress of the accident prevention movement in fertilizer manufacturing plants.

In his review of the section's activities during the past year, the general chairman, George F. Dietz, safety director, Fertilizer Manufacturers Cooperative, Baltimore, Md., reported that for the first seven months of 1958, figures from 172 companies showed that the frequency rate (number of accidents per million man-hours worked) was 7.94.

He recalled that in 1955, when 173 companies reported, the frequency rate had been 17.27. In 1956 reports from 174 companies put the frequency rate at 10.59 and in 1957 reports from 175 companies gave a frequency rate of 10.93.

That drop in the frequency rate from 17.27 in 1955 to only 7.94 in the first seven months of this year, Mr. Dietz declared "is truly remarkable. It indicates that the industry got through the spring rush with a record that was far better than ever before."

The following day's session was presided over by the chairman-elect, George L. Pelton, of Smith Agricultural Chemical Co., Columbus, O. In his preliminary remarks, Mr. Pelton said he had been looking over the statistics and, while that frequency rate of 7.94 for the first half of this year was something to be proud of it was also "something pitiful." National Safety Council records for the entire chemical industry, including fertilizer, showed that the 1957 frequency rate for all chemical categories combined was 3.55, he stat-

ed, while for the fertilizer category alone the rate last year was the second highest for all chemical classes. The severity rate for the entire chemical industry (time charges in days per million man-hours worked) was 536. Here fertilizer manufacturing led the severity record with the highest severity rating among all chemical categories.

There's still a lot of work to be done, Mr. Pelton dryly added, if the industry truly wishes to save lives and avoid suffering caused by preventable accidents.

First order of business at the section's opening session, Oct. 20, was election of officers, with the following results:

General chairman—George L. Pelton, personnel director, Smith Agricultural Chemical Co., Columbus, O.; vice chairman—Elmer Perrine, technical director, Nitrogen Div., Allied Chemical & Dye Corp., New York; secretary—Ansel I. Raney, safety director, Phillips Chemical Co., Bartlesville, Okla.

The retiring chairman, Mr. Dietz, became automatically a member of the executive committee. New members elected for 3-year terms include W. C. Creel, safety director, North Carolina state Dept. of Labor, Raleigh, N. C.; John S. Mark, production manager, Farm Bureau Cooperative Ass'n, Columbus, O.; Yen Shen, Taiwan Fertilizer Co., Taiwan, China; and W. A. Stone, plant manager, Wilson & Toomer Fertilizer Co., Jacksonville, Fla. The new president, Mr. Pelton, also serves on this committee.

The training school program for supervisors, which got under way in 1958, has been the fertilizer section's most constructive contribution to the cause of accident prevention in the fertilizer industry, declared W. C. Creel, safety

director, N. C. Department of Labor, in submitting a report on this project.

Three regional schools have been held to date, he stated, at Ithaca, N. Y., Atlanta, Ga. and Chicago. Total attendance was 181 persons, including 99 supervisors, 44 top management executives and 18 members of the section's executive committee. A fourth school was scheduled for Austin, Tex., on Nov. 13 and 14, and the year's program was to be completed with a fifth regional school at Fresno, Calif., Dec. 2 and 3.

The supervisor is the key man in any industrial safety program, Mr. Creel asserted, but, as yet, little has been done by individual plants to give him the necessary training and much less done on an industry-wide basis.

"Let's be realistic about the need for training supervisors," said Mr. Creel. "He's the man between management and the man on the job. If you fail to train the supervisor, you set up a bottleneck that will block your safety program. Train the supervisor well, and you will get the full benefits of a safety program in action."

In a discussion of "Accident Reporting and Analysis," John E. Smith, safety director, Spencer Chemical Co., Pittsburg, Kans., remarked that keeping top management interested in accident prevention is always a problem. Accident reports fit in there ideally, he said, because they can be used to show management how to save money.

In a paper on "The So-Called Accident-Prone Individual" Dr. John H. Foulger, director of medical research, E. I. du Pont de Nemours & Co., Wilmington, Del., claimed that "there's no such a 'person.'"

That term "accident-prone", he said, was "invented" by chance forty years ago and is being widely overused. The term, he said, is not synonymous with "accident liability" and people are trying to explain it by every means except the man himself.

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The firm uses Sewn Open Mouth Multiwalls in part of its operation. Cartledge recommended adding Union's special SEW STRONG construction (reinforcing strips at top and bottom of bag). The stronger closure enabled the basis weight of each bag to be reduced by 10#. The new sewing method led to a reduction in bag length,

an improved bag design—and \$4.05 per M savings! Another recommendation: convert all the firm's

present Sewn Valve Multiwalls to Sewn Open Mouth types. This complete changeover will further streamline bagging and, based on the company's annual requirements, result in thousands of dollars in additional savings.

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"There is nothing in any study anywhere," said Dr. Foulger, "which shows that people who sustained a series of accidents in the period under study continued to have accidents the rest of their lives."

Accidents, he said, depend on external or internal factors affecting a man's bodily health. He reviewed studies showing how blood pressure and pulse rate are affected by anger, or anything else, from a family squabble or a sick child at home to severe financial losses or a poor showing at golf.

"What causes accidents?" was a question asked by Vernon C. Page, chief engineer, Sohio Chemical Co., Lima, O., whose paper was titled "Safe Practices in Handling Ammonia and Nitrogen Solution's."

His answer was "People—people and the errors they make." This he substantiated in reviewing answers received from 60 of the 75 companies to whom he had written before starting work on this paper. Among the 60 were reports on 32 major accidents—ones which had resulted in a major loss of the product involved.

"In only three cases," stated Mr. Page, "was human error not a factor. The other 29 resulted from failure of the human factor."

Most of the 32 major accidents, he said, were caused by mishandling of pipes and fittings. In three cases, the man opened the wrong valve. In one case, the safety valve was seeping and the man tapped it. The pressure was already too great, and the tapping increased that pressure until the valve popped open. In another case, tapping broke the nipple with disastrous results.

Two accidents occurred when the men were trying to make repairs on a line that was under pressure. Two others were due to failure of cast iron bushings—"something that has no place in fertilizer solutions," Mr. Page commented.

In one case, someone failed to disconnect the hose in filling an

ammonia tank truck. The driver, unaware of this, drove off and, according to the report made to Mr. Page, "the whole town had to be evacuated at 5.30 a.m."

Ways to prevent accidents? Mr. Page suggested these rules:

1. Study the job before you start.
2. Recognize the hazards involved.
3. Take action to avoid or overcome them.

The second session of the fertilizer section's Chicago meeting was opened with the showing of a motion picture, "Knowing's Not Enough," loaned by the producers, United States Steel Co. The film portrays the part played by the "Four Imps,"—impatience, impulsiveness, improvising and impunity—in causing accidents. Persons wishing to make use of this film, it was announced, should contact any U. S. Steel office anywhere.

Climax of the Chicago meeting was a panel discussion of actual accident case histories presented by executives of eight fertilizer companies. Each speaker, in five minutes, told what had happened, the conclusions as to why it happened, and what was done about it.

Mike Ellison, protection supervisor, of the Mississippi Chemical Corp., Yazoo City, Miss., told how a customer's tank truck was being filled with anhydrous ammonia when the hose on the truck ruptured. "We have no control over a customer's facilities," said Mr. Ellison, "We try to get them to test their hose once or twice a year and put a good one on if necessary. Otherwise, we try to get them to let us use an adapter."

C. S. Griffith, superintendent, Virginia-Carolina Chemical Corp., Cincinnati, O., told of the trouble which resulted when a customer's son backed his truck up to a loading dock and got hurt when he attempted, by himself, to get the company's mechanized conveyor into position. The customer was "sensible" said Mr. Griffith, and V-C Chemicals suffered no loss.

John S. Mark, production manager, Farm Bureau Coopera-

tive Association, Columbus, O., told of an explosion that occurred at one of the co-op's most recently built fertilizer plants. All control switches have been concentrated in one "dust free" switch room. However it wasn't "dust proof", and when an employee entered to close a switch, the resulting dust explosion burned the man severely. A fan to provide higher inside pressure has been installed in the room, said Mr. Mark. He suggested that "When you're building a new plant it's a good idea to check the blue prints and try to spot hazards before construction begins. In our case we might have located that control room in an area where there would have been less dust."

Stratton M. McCargo, personnel supervisor, G. L. F. Soil Building Service, Ithaca, N. Y., told of an all too familiar accident in the industry where a man was severely hurt when an overhanging quantity of fertilizer in a storage bin fell on him as he was adjusting an explosive in a hole he had drilled.

"This problem of falling overhang has not been licked by our industry," said Mr. McCargo. "We ought to get together sometime to find out what can be one about it."

Gaither T. Newnam, insurance, safety and labor relations director, Smith-Douglas Co., Norfolk, Va., submitted a case which substantiated his contention that "an employee seems to get hurt more often when he's not doing his regular job." In this case the man lost four fingers on a buzz saw which he had no business trying to operate.

A. I. Raney, safety director, Phillips Chemical Co., Bartlesville, Okla., told of what happened when an employee used an unclean bucket to carry some chlorinated lime. He had no idea of what could happen from a combination of lime, high humidity and certain organic matter, but he knows now and will never forget it, this report indicated. This accident, Mr. Raney underscored, points up

(Turn to Page 113)



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of fertilizer quality. Plants, not only in Tuscola, but also in Sunflower, Kansas, and Dubuque, Iowa.

To help you make the most of these various products, U.S.I. Technical Service people are ready to work with you. The U.S.I. Engineer will help you trouble shoot, set up formulations, work with you on experimental runs, consult with you on equipment selection, and can also offer U.S.I.'s laboratory facilities for more intensive investigations.

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OK Toxaphene For Household

The Hercules Powder Co., Wilmington, Del., has announced that "Toxaphene" has been officially accepted for registration as a household insecticide. Hercules is the sole producer of technical toxaphene.

The new development means that formulators can use toxaphene in such items as space sprays, aerosols, and mothproofing agents. Among the pests toxaphene controls are flies, mosquitoes, gnats, silverfish, bedbugs, roaches, house spiders, black carpet beetles, clothes moths, fleas, and many small flying insects. Toxaphene does not require an auxiliary aromatic solvent and has a long residual biological activity.

Mold Retardant for Cantaloup

The Food and Drug Administration recently established a tolerance that permits the use of sodium orthophenylphenate by fruit packers on cantaloups. The product is used to retard surface molds.

The tolerance permits residues of 125 parts per million of sodium orthophenylphenate, with not more than 10 parts per million in the edible portion. The product already is being used commercially on grapefruit, kumquat, lemons, limes, oranges, apples, pears, tangerines, citrus, citron, and tangelos, and also has been cleared for peaches and pineapples. Fruit packers or processors have been invited to contact the Dow Chemical Co., Midland, Mich., for information about treating procedures.

Eptam, Randox For Watergrass

Preliminary tests by U. S. Department of Agriculture agronomists at the University of California indicate that two new experimental chemicals can control watergrass in rice fields.

Eptam, a product of the Stauffer Chemical Co., New York, can be applied to dry soil 10 days before planting at the rate of one

pound per acre without injuring the rice.

Randox, or CDAA, a product of the Monsanto Chemical Co., St. Louis, Mo., can be used on soil that has been lightly irrigated. Randox was added at the rate of four to eight pounds per acre before flooding the soil. The rice was planted four days later.

Neither chemical has been registered for use on rice so far.

See Doubled Potash Capacity

The United States potash industry is predicting that North American capacity will more than double by 1970-71. Canadian estimates of future consumption indicate that potash production will have to double itself again by 1985 if all needs are to be met.

The Royal Commission on Canada's Economic Prospects is quoted as saying that a minimum of 8 million and a maximum of as much as 10 million ton of K₂O must be supplied if Canadians and Americans are to counteract annual soil losses twenty-five years hence.

This means, the report states, an in-place North American capacity of at least 7.5 million tons K₂O per year by 1980.

The industry is in a transition period right now and, during the next few years, producers in the U. S. are going to have to decide whether to sink huge capital investments into potash-rich Saskatchewan. Up until now, the area around Carlsbad, N. Mex., has supplied the lion's share of potash in North America. Last year, New Mexico supplied 92 per cent of domestic output, and that figure has been fairly constant over the past several years.

Potash producers operating in the Carlsbad area include Duval Sulphur & Potash Co., Houston, Texas; International Minerals & Chemical Corp., Skokie, Ill.; National Potash Co., New York; Potash Company of America, Carlsbad; Southwest Potash Corp., New York; and United States Potash

Billings Joins PCA

Robert Billings has joined the Potash Company of America, Carlsbad, N. Mex., as a sales representative for the states of Iowa, South Dakota, Nebraska, Kansas, Oklahoma, and Colorado. He is headquartered at Peoria, Ill.

For the past ten years, Mr. Billings has been a mine and safety engineer at the Carlsbad plant of the Missouri School of Mines.

Co., a division of United States Borax & Chemical Corp., New York.

Domestic producers outside the Carlsbad area include American Potash & Chemical Corp., Los Angeles, producing from Searles Lake brine at Trona, Calif., and Bonneville, Ltd., at Wendover, Utah. Dow Chemical Co., Midland, Mich., recovers some potash from brines.

The Carlsbad group of potash producers believes that the area will supply the bulk of North American requirements for some years to come. But in Canada, a single producer alone holds potash reserves said to be as much as those held by all the companies in the Carlsbad area.

Carlsbad producers are faced with continually rising labor costs. In fact, wage rates paid in New Mexico are among the highest in any industry in the country. In addition, potash prices are at their lowest point since before World War I. Since the Carlsbad facilities must be run nearly full tilt in order to be economically feasible, the squeeze between low prices and high cost has caused Carlsbad producers to give attention to cost advantages in Canada.

The ponderous weight of economic factors has put the Carlsbad producers into the uncomfortable position of making a decision. They are reluctant to leave New Mexico, but must concede that the economics of the situation appear to rule out the possibility of operations both at Carlsbad and Saskatchewan.

Dealer Promotion Aids Feature of Garden Show

SOME 25 manufacturers of chemicals and fertilizers for the home gardener were on hand at the Garden Supply trade show, which was held on Chicago's mile-long Navy Pier, Nov. 7, 8 and 9. Several new products for control of insects and diseases of garden plants were presented for the first time by various manufacturers who have also paid considerable atten-

tion to redesigning containers for more effective merchandising in self-service stores.

Especially notable was the evidence that manufacturers are making an effort to provide dealer promotional materials to help sell more products. In the interests of sales promotion, *Garden Supply Merchandiser* sponsor of the garden show, conducted a two-day re-

tail management school with workshop courses in advertising, sales promotion, salesmanship and store layout and design.

Typical of the many dealer aids available is the "Business Booster Broadside," issued by Acme Quality Paints, Detroit, Mich., for use by its customers. This is a full color sheet imprinted with dealer's name, which shows prospects how to select Acme chemical control products for lawns, shrubs, flowers, vegetables and fruits.

California Spray Chemical Corp., Richmond, Calif., has prepared a new set of movie shorts on gardening topics, to be shown by its dealers to garden clubs and others in 1959. Cal-Spray's well-known Garden Book, in ten different editions to apply to regional conditions, has been revised to include new information on pest control problems. Introduced at the Chicago show was "Phaltan," a fungicide for roses, which will be available in 1959. First showing was made of "Ortho Borer Spray" for borer control on ornamentals. The company has a new 72 per cent chlordane spray for pre-emergence crabgrass treatment. Kenneth Dietzen, regional manager, at Maumee, O., said Cal-Spray is also testing a number of other new formulations which will be announced later.

B. G. Pratt Co., Paterson, New Jersey, introduced a new liquid spray for insect and disease control on roses and ornamentals. For home owners with foundation plantings of evergreens, Pratt has a new spray formulated with three insecticides, and a new 15-10-5 liquid plant food in one-quart container, which can be attached to a hose line.

Weedez Corp., Kansas City, Mo., has solved the problem of using 2,4-D in gardens without danger from drift of the powder or fumes. It's a Weedez Wonder Bar, made of solid wax incorporating the active pesticides. Instructions indicate that dragging the

How to Formulate LIQUID FERTILIZERS Faster... More Accurately with NIAGARA ELECTRICCONTACT METERS

Formulating plants can obtain a larger share of the liquid fertilizer business by accurate automatic metering of the batch ingredients with Niagara Electriccontact Meters. This modern method lowers costs and increases profits.

Niagara Meters precisely measure volumetrically. Each rotating cycle of the piston displaces a fixed volume which remains constant for any specified liquid and temperature range. Set the meter to the desired gallonage and the meter automatically stops the flow when that gallonage has been delivered. Errors are eliminated. Accuracy is positive.

There is a Niagara Meter to handle any type of liquid. Each Niagara Meter is guaranteed to be individually tested and calibrated at the factory to run with close tolerance limits at all rates of flow within its rated capacity.

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Meter. Set it and
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There's never a doubt when you use Niagara Electriccontact Meters for making liquid formulations. Just set the meter for the number of gallons required and the meter automatically does the rest.

BUFFALO METER CO.

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wax bar across a lawn deposits a thin film on broadleaf weeds.

Niagara Chemical Div., FMC, Middleport, N. Y. featured their new anti-coagulant rodenticide, "Diphacin," which, it is claimed, works faster than Warfarin. Also featured was a soluble pre-emergence weed killer, "Swep," available in small size packages.

Boyle-Midway's Antrol garden division, announced availability of two formulations with increased percentages of malathion and chlordane. Shown by Tom Blankly, sales manager, and his assistants was the company's extensive "Antrol" line of garden chemicals with "built-in" customer conveniences.

American Chemical Paint Co., Ambler, Pa., promoted gibberellic acid in an aerosol dispensing container, also their well-known "Weedone" weed killer and other garden chemicals for varied purposes.

Arnott Chemical Co., Indianapolis, Ind., featured "Mosquito x" said to have residual effectiveness for 1 to 3 months. "Poison P-nut," for gophers and moles was shown, also "Arnco Warfarin."

Velsicol Corp., Chicago, explained to dealers the new spring crabgrass campaign they will be emphasizing. There will be advertising and plenty of promotional materials as well as 100 percent sales support, dealers were told.

Faesy & Besthoff, New York, introduced a new 10 per cent chlordane dust for garden insect control, also new formulations for tomato, evergreen and azalea foods, dried blood for repelling deer, a termite control chemical and other specialties. Edward T. McGown, midwest sales manager in charge.

American Agricultural Chemical Co., New York, made their first showing of a water soluble plant food, that, after testing for a year and a half, will be placed on the home garden market next spring. It is a granular material that does not cake. Pesticides, turf foods and other products were also shown.

Featured by Nursery Specialty Products, Co., Croton Falls, N. Y. was "Wilt-Pruf," an anti-transpirant which prevents wilting of foliage on trees and shrubs which are being transplanted in full growth on hot summer days.

International Minerals & Chemical Corp., had a large display of their new "Once a year" lawnfood, "Thrive," for home lawns and golf courses. This product was first introduced last spring in Rockford, Ill., South Bend and

Fort Wayne, Ind., and later in Chicago and Milwaukee. Markets east of the Mississippi will be entered in the coming season, and eventually "Thrive" will be distributed nationally.

Of the applicators on display at Chicago, considerable attention was drawn to the Du Pont Co's new garden "Flip-Duster." The unit consists of two metal chambers connected by a flexible bellows, and each flip of the wrist blows a cloud of dust in the desired direction.

GLENDON — at Glendon, N. C.



Offering:

INSECTICIDE GRADE PYROPHYLLITE

- pH 6 to 7
- 30 lbs. per cu. ft.
- avg. particle size below 5 microns
- non-alkaline
- chemically inert
- 92-95% passes a 325 mesh screen
- non-hygroscopic

Insecticide Grade Pyrophyllite is the ideal diluent and conditioner for all types of insecticidal dusts. As it is non-hygroscopic, dusts compounded with Insecticide Grade Pyrophyllite will not absorb moisture. Nor is there any tendency even during extended storage, for the carrier to separate from the active ingredients.

Insecticide Grade Pyrophyllite has superior adhering properties, and because it is difficult to wet, it holds well on the plant leaves even during rain. When used as a carrier for products to be dusted by airplane, it settles rapidly minimizing drift, waste of materials, etc.

GLENDON PYROPHYLLITE COMPANY

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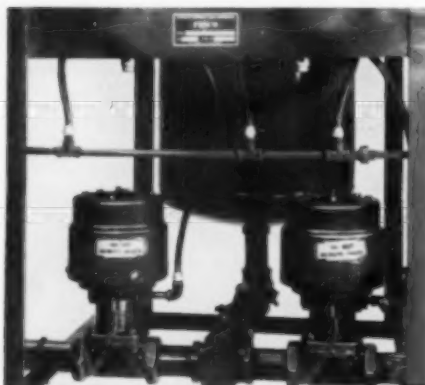
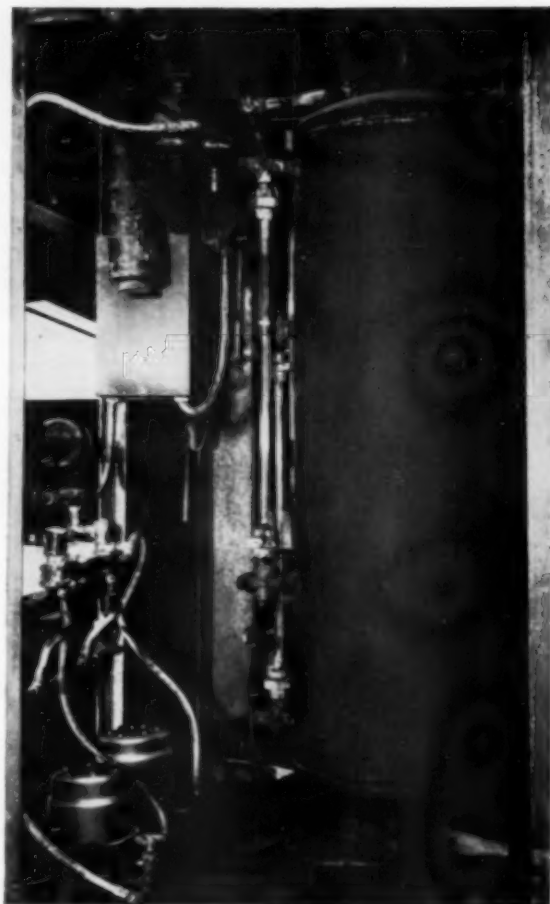
Plant and Mines
Glendon, N. C.

Handles fertilizer solutions with an **EXTRA MARGIN OF SAFETY**

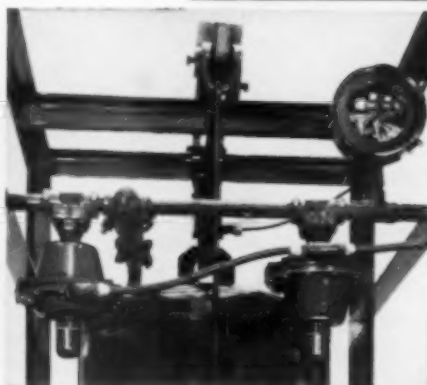
The fertilizer solutions industry is turning more and more to Grinnell-Saunders Diaphragm Valves for trouble-free performance and long life. The design of the valve provides smooth, streamline fluid flow and positive closure. Diaphragm completely isolates bonnet mechanism from corrosive fluids in the line and eliminates the possibility of troublesome stem leaks.

Maintenance is less a problem with Grinnell-Saunders Valves, too. The only part of the valve that ever needs maintenance is the diaphragm, which can be changed in minutes without removing the valve from the line. No refacing or reseating is required.

Grinnell-Saunders Diaphragm Valves are unsurpassed for handling fertilizer chemicals as diverse as nitric, sulphuric, phosphoric acids and their ammonium, sodium or potassium salts. Bodies available in cast iron (plain or of rubber lined), aluminum, stainless steel; diaphragms rubber, neoprene, teflon, or other synthetics. Handwheel, quick-acting lever, or power operated. Grinnell Company, Inc., Providence 1, Rhode Island.

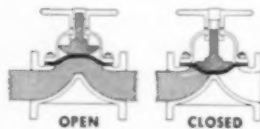


AT BASE . . . Two 2" Grinnell-Saunders Diaphragm Valves, with Bendix-Westinghouse topworks. Left hand valve opens at start of cycle. When predetermined weight is reached, this intake valve closes automatically — while the outlet valve at right opens, permitting emptying of tank.



AT TOP . . . Two 3/4" Grinnell-Saunders Diaphragm Valves with Grinnell Air Motor topworks. Right hand valve acts to vent tank during filling. When maximum capacity is reached, right hand valve closes and one at left on compressed air line opens, to force out anhydrous ammonia.

▲ THIS WEIGHING TANK, manufactured by Fertilizer Equipment Sales Corporation, Atlanta, Ga., is used for weighing ammonium nitrate solutions, sulphuric acid and anhydrous ammonia. When preset weight is reached, scale balance trips micro-switch, activating power-operated Grinnell-Saunders Diaphragm Valves which automatically perform the following: (1) shut off ammonia to tank; (2) close air vent from tank; (3) open compressed air into tank; (4) release ammonia into the fertilizer mixer located nearby.



GRINNELL-SAUNDERS DIAPHRAGM VALVES



Grinnell Company, Inc., Providence, Rhode Island

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pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

Equipment, Supplies, Bulletins

Pesticide Cost Calculator

A pesticide cost calculator is being offered by the Pest-Cal Co., Box 551 Lemon Grove, Calif., that is said to provide quick and accurate calculations for dosages of over 70 pesticides.

On one side of the circular chart insecticide formulations are divided into emulsifiable concentrates, wettable powders, and solutions to give dosage rates for insecticides, rodenticides, or herbicides. On the reverse side, a cost calculator figures finished spray costs.

Atomizing Nozzle Booklet

A new line of atomizing nozzles, manufactured by the Schutte and Koerting Co., Cornwells Heights, Pa., is described in a bulletin prepared by the company. The nozzles are designed to produce fine, uniformly atomized, hollow-cone sprays and are intended for service in operations where liquids in small quantities, not over about 3 gpm, are to be sprayed as fine mists. They are available in 15 orifice sizes.

The bulletin, 6A-661, can be obtained from the company at Cornwells Heights, Bucks County, Pa.

Nitroform Handbook

Nitroform Agricultural Chemicals, Woonsocket, R. I., is offering a manufacturers' handbook on Nitroform that describes the chemistry of Urea-form and lists its properties and uses.

The booklet is aimed at selling fertilizing to the turfgrass industry and points out that turf appears to be the number one agricultural enterprise in this country. The booklet quotes Dr. Felix V. Juska of the U.S.D.A., Beltsville,

Md., whose figures indicate that there are nearly 14 million acres of turf in the country with an annual maintenance cost of three billion dollars.

The booklet is available from the company at 92 Sunnyside Ave., Woonsocket.

Applicator on Lawn Mowers

A new method of distributing herbicides and insecticides on lawns is being produced by the Spray-Mow Co., Belleville, N. Y. A spray-attachment fits on a rotary lawn mower and consists of a non-corrosive plastic reservoir for the liquid, a vinyl tube, and two metal alloy hook spray nozzles that hook under the skirt of the mower and direct streams of pesticides into the path of the rotating cutter blades.

Among the advantages claimed by the company for the device are an even coverage of lawn area, no spray drift, and ease of operation.

Booklet On Gibrel Uses

Merck & Co., Rahway, N. J., is offering an illustrated booklet entitled, "What You Can Tell Farmers About Gibrel." The booklet outlines the development of gibberellin growth stimulants, tells how they work, and lists practical uses of the product.

Formulations of Gibrel also are included in the booklet which was prepared in semi-technical form for use by dealers in agricultural chemicals.

Ajax Conveyor Manual

A 16-page guide to the selection of vibrating conveyors for bulk materials has been prepared by the Ajax Flexible Coupling Co., Westfield, N.Y.

The new publication gives information on materials handling operations that can be performed simultaneously with conveying. Flow charts, illustrations of different types of applications, capacities, dimensions, and other selection data are included.

Planting Schedule Chart

A 1958 Fall Planting Schedule for South Carolina field crops, has been published as a 12 x 18-inch chart by the Clemson Agricultural College, cooperating with the USDA, Extension Service.

The schedule includes information on seeding, fertilizing, top dressing, and other miscellaneous information on the following crops: alfalfa, oats, barley, wheat, rye, fescue and ladino, ryegrass, rescue, and annual grazing mixture.

Hudson Side Handle Bag

The Multiwall Department of the Hudson Pulp and Paper Corp., New York, has announced the successful application of a double side handle to multiwall bags which easily supports weights of 50 pounds and more.

According to the company, this innovation makes 50 pound bags as easy to carry as a suitcase. The handle is expected to have great sales benefits because of the convenience for the end-user.

Measuring Fumigation

Data sheet on the "Fumscope," describes how the instrument measures the concentration of methyl bromide gas in a space under fumigation. Instrument shows when and where the gas concentration is sufficient for a kill . . . where the leaks are occurring, and whether the gas is penetrating to all the insects. Enables thorough fumigation in minimum time, and the elimination of poor jobs and do-overs.

Instrument reads out in ounces per 1000 cubic feet. Sold in two portable types—one operates from line power, the other from self-

contained batteries. Manufacturer: Robert K. Hassler Co., P. O. Box 177, Altadena, Calif.

Penco Grain Desiccation

Pennsalt of Washington Division, Pennsalt Chemicals Corp., Tacoma, Wash., has prepared a technical bulletin on milo and grain sorghum desiccation with Penco Liquid De-Fol-Ate.

The bulletin lists advantages for the product and tells when and how it should be applied.

Diamond Pesticides Reviewed

"Your Ready-Reference Guide to Dependable Diamond Weed and Brush Killers for Effective, Easy, Economical Weed and Brush Control" is the title of an illustrated, 12-page booklet just issued by Diamond Alkali Company, Cleveland, Ohio.

Briefly reviewed in this pocket-size catalog are the Crop Rider, Fence Rider, and Line Rider groups of packaged, ready-to-use Diamond herbicide formulations

designed and developed expressly for handling a diverse range of weed and brush control work efficiently.

Application areas suggested in the booklet include farms, highways, secondary and rural roads; public utility lines; railroad, pipeline and other rights-of-way, and factory sites, plant grounds and other industrial areas.

Amine salts, regular esters and low volatile esters of 23 specific Diamond formulations are summarized. Their particular applications for controlling broad-leaved weeds and clearing brush and woody plants are also cited.

Copies of this literature are available on request. Write to Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

If the stability of your insecticide is important to you . . .

read these facts on carrier compatibility

Phosphate decomposition can usually be traced directly to the carrier. Unless the carrier is uniformly produced, has the proper pH, and has a low moisture content, you will *always* have trouble with product stability. And, as toxicant manufacturers know only too well, an unstable product does not build good customer relations.

That's why manufacturers turn to Pike's Peak Clay . . . a uniformly produced carrier in sizes from 325 mesh up to $\frac{1}{2}$ ". Its exceptionally low moisture content and ideal pH of 5 far exceed the normal performance standards of other carriers. In addition, it is less hygroscopic and has free-and-easy flowability. But probably one of the most important benefits you get with Pike's Peak Clay is that this one carrier is equally as outstanding for *both organic phosphates and for hydrocarbons*. Yes, . . . *only one carrier to buy . . . one carrier to store . . . one carrier to use.*

Write today for a sample of Pike's Peak Clay for laboratory testing. Or, better still, call GRaceland 7-3071 in Chicago. But, do it now.



GENERAL REDUCTION COMPANY

1820 ROSCOE STREET • CHICAGO 13, ILLINOIS

KVS Air-Gravity Conveyor

The Kennedy Van Saun Mfg. & Eng. Corp., New York, New York began this year the volume production of its "Air-Float Air-Gravity Conveyor." This conveyor is constructed with an exclusive porous tile which results in higher capacity and improved resistance to corrosion, abrasion and surface blinding, over competitive air-gravity conveyors. The casing is extremely rugged and because operations are done on production machine, price of this conveyor is competitive. A new bulletin No. 58-K describes this product.

Potato Sprays Folder

Plant Protection Ltd., London, is offering a folder on potato sprays. Described in the folder are Perenox, P. P. Zineb, and Hawmac.

Perenox is listed for the control of blight and P. P. Zineb is recommended for use in areas where the crop is liable to wind damage and in dry seasons when aphid attack is heavy. Hawmac destroys potato haulm, prevents blight spreading to the tubers at lifting time and makes mechanical harvesting easier, according to the folder.

For uniformly conditioned
mixed goods, use

Du Pont UAL-S

Here's how it works . . .

New Du Pont UAL-S permits you to take advantage of the well-known conditioning effect of sulfates in fertilizers. A small amount of ammonium sulfate added in a finely dispersed form as in UAL-S is equivalent to a much larger amount added dry to the mixture . . . ammonium sulfate means better, more uniform conditioning. All of your fertilizers will benefit from nitrogen derived from UAL-S, because it combines two efficient forms of nitrogen with ammonium sulfate to provide added sulfur . . . an essential plant nutrient with recognized agronomic value.

Regular mixtures cure well with UAL-S,

are free-flowing and resist caking. In granular mixtures, UAL-S aids in producing good yields of hard, round, firm granules that store and distribute well. UAL-S is non-corrosive to fertilizer manufacturing equipment, including mild steel and aluminum, and it's safe—handles at moderate pressure, and there's no danger of flash fires.

Du Pont specialists can give you at-the-plant advice on proper use of UAL-S in your fertilizer mixtures. They stand ready to assist you in profitably formulating mixtures containing UAL-S. For further information on UAL-S, fill out and mail the coupon.

PROPERTIES OF UAL-S

Nitrogen Content	42.5%	Composition: Parts 100	
Freezing Point	20°F.	Urea	38.8
Pressure	15 psi at 60°F.	Ammonium Sulfate	10
Specific Gravity	1.13	Ammonia	27.1
Fixed to Free Ratio	.9 to 1.0	Water	15.1
		CO ₂	9.0

*Du Pont UAL solutions in mixed fertilizers have helped
American farmers grow better crops for 25 years.*

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another fertilizer project
designed and equipped by **DORR-OLIVER**



Mexico's first Triple Superphosphate plant

Designed to produce 150 metric tons per day of granular fertilizer, the plant sketched above is part of a Mexican government program to promote agriculture and increase industrial independence. It will be the latest of several chemical and fertilizer operations of Guanos y Fertilizantes de Mexico, S. A., and the first Mexican plant producing triple superphosphates. Start-up is scheduled for 1960.

Like so many of the most modern fertilizer plants erected throughout the world, this new venture will employ the Dorcco Granular Fertilizer and Dorcco Strong Phosphoric Acid Processes.

Plant design, engineering and equipment for these processes are being supplied by Dorr-Oliver Inc. The contract with Dorr-Oliver also calls for design, engineering and supply of equipment for the unloading and storage of raw materials, shipping, power production, warehouse and laboratory facilities, and for offices and other buildings.

The services of Dorr-Oliver cover all phases of fertilizer plant design, from laboratory studies and economic evaluation to supplying a complete operating facility of any size. Write for a copy of Bulletin No. 8000 — or let us send an engineer to discuss your particular project. No obligation, of course.



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AAAS To Meet In Washington

The 125th meeting of the American Association for the Advancement of Science will be held in Washington, D. C., December 26 to 31. All 18 sections of the association will have programs and approximately 92 affiliated societies of the AAAS will participate.

The Sheraton-Park will be the headquarters hotel. Among agricultural discussions planned are four sessions on the topic, "Water in Agriculture."

Dow Names St. Louis Area Rep.

Gene W. Wagon has been moved to the agricultural chemical sales staff of the St. Louis district office by the Dow Chemical Company. Wagon will represent Dow on their full line of farm and industrial products in the southern parts of Indiana and Illinois and adjacent parts of Missouri, Kentucky and Tennessee.

Delaware Crop Program

Exhibits of farm machinery, fertilizer, seed, and chemicals were a feature of this year's Delaware Crop Improvement Association Program Nov. 24-25 in Dover, Del.

A crop and soils short course featured specialists on corn and soybeans. This was the group's 50th anniversary meeting.

To Operate N.C.I. Plant

Northern Chemical Industries, Baltimore, Md., has contracted with Chemetron Corp. (formerly National Cylinder Gas Corp.) for the latter's Chemical Division to operate its new Ammonia plant and related facilities at Searsport, Maine under a five-year lease. N. C. I. will act as sole distributor of the production.

Stauffer Int. Names Walker

Frank B. Walker has been appointed sales development manager, Latin America, by the International Division, Stauffer Chemical Company. Mr. Walker, who had been a technical representative of Stauffer's Agricultural Chemi-

cals Division stationed in New Orleans, will be headquartered in Sao Paulo, Brazil.

Seek American Partnership

A chemical and fertilizer plant in Tetuan (Morocco) is interested in a partnership association with an American firm, to enlarge the plant and increase its line of agricultural products. Those interested are urged to contact Mr. Antonio Marce, Casanova #111, Barcelona, Spain.

Smith Named Project Manager

Dr. D. R. Smith has been named product manager in the New Chemicals group of Union Carbide Chemicals Company, division of Union Carbide Corp., New York. In his new position, Dr. Smith will direct the market development of Carbide's nitrogen and chlorine compounds. In this and chlorine compounds.

Before joining Carbide in 1956, Dr. Smith was a senior scientist at Oak Ridge.



TYPE 41 CLAY

In making organic concentrates using benzene hexachloride, chlordane, toxaphene, and other similar materials, it is important to have the concentrates free flowing.

TYPE 41 Clay can be combined with more costly diluents, such as Fuller's earth, and the result will be a free-flowing concentrate, at a lower cost to the producer.

TYPE 41 Clay has the following advantages:

- NON ABRASIVENESS
- FINE PARTICLE SIZE
- ADSORPTIVENESS
- PROPER BULK
- HIGH INSECTICIDAL VALUE OF CLAY ITSELF
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- NO PHYTOTOXICITY TO PLANTS
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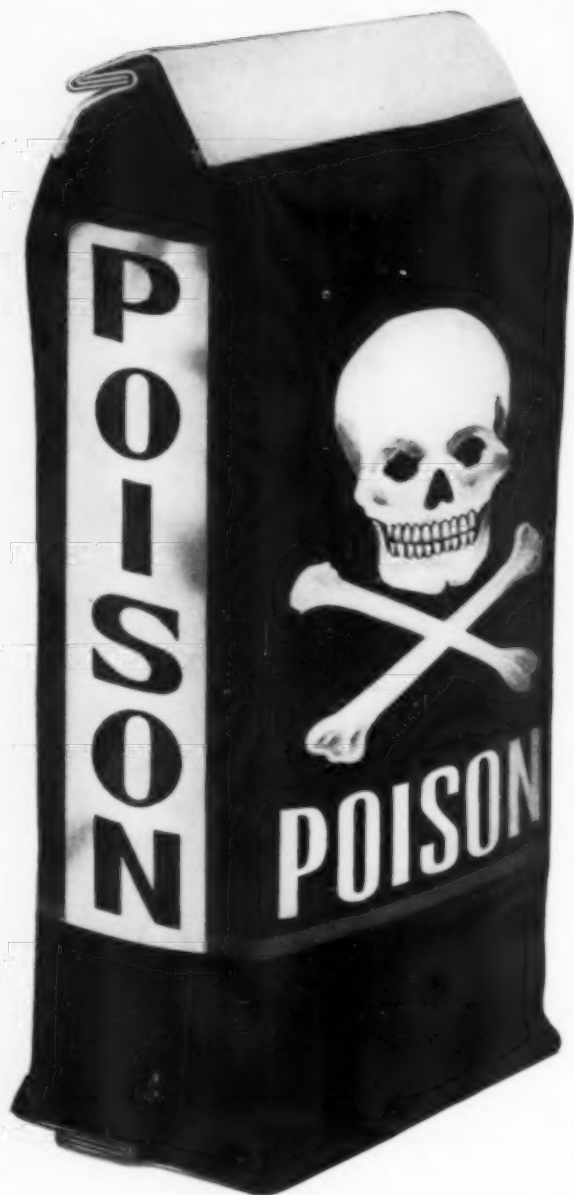
For Further Information or Samples Write to

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CLAY COMPANY

AIKEN, SOUTH CAROLINA

STOP SIFTING!



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POWDERS
SAFELY
IN
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OF FLEXIBLE PACKAGING MATERIALS

You can't take chances when you're packaging poisonous powders. Sifting can be dangerous!

Duotite bags look neat and trim. And with Continental's expert printing they have plenty of sales appeal. Call on Continental for the best package for poisonous powders and other special chemical products.

That's why you should use Duotite bags by Continental. Duotite bags are of rugged construction with or without special liners to meet your product specifications. They have double-folded bottoms secured by both heat seal and adhesive. They're durable, too—give strong resistance to breakage.

ROUND TABLE

(From Page 33)

content) of the soil phosphatic materials is also of great importance, observed Mr. Martin.

Continuing the discussion, W. Harwood, IMC, also commented on the importance of physical properties. The porosity of the materials is probably the most important of the properties. Regarding particle size, he remarked that ammoniation increases as particle size decreases. The reaction temperature, when normal superphosphate is used, is not too important a factor in ammoniation; — but when triple super is the phosphate source, temperature is very important.

Listing operation factors for maximum ammoniation with minimum loss, Mr. Harwood recommended: correct formulation, efficient reaction time, temperature control, ventilation, good house-keeping, adequate drying facilities with good control, and good cooling facilities.

At the Cyclone

ONE of the problems in fertilizer processing is the build-up of material on the interior of cyclone-type dust collectors. Comments by various round table members, offered several suggestions as to how to cope with this problem. It was pointed out that moisture is a big factor in causing solids to build-up in cyclones, and that operating with gas temperatures above the dewpoint avoids condensation. Another solution is to supply heat by external means, for example resistance wires, . . . but although this would solve the problem, it would be too costly. Insulating ducts or a cooler entering the cyclone serves to eliminate condensation and build-up. Keeping the cyclone at about the same temperature as the air going through will also reduce condensation.

The use of rotary locks will provide seals for the bottom of the cyclone, and serve to keep out air which causes condensation. Condensation resulting from leaks allowing air to enter the cyclone can be avoided by superheating the gases in the system. Rotary locks are set to keep seals at the bottom of the dryer, to allow for adequate maintenance, — otherwise the efficiency is way off.

The hypothesis that lining cyclone type collectors with a polyethylene or Teflon-type material might eliminate material build-up,—on the theory that the hygroscopic materials of fertilizer products might not stick—has been investigated and found impractical because water tends to run down the sides of such a lining.

Part 2 of the Fertilizer Industry Round Table Report will appear in the January issue.



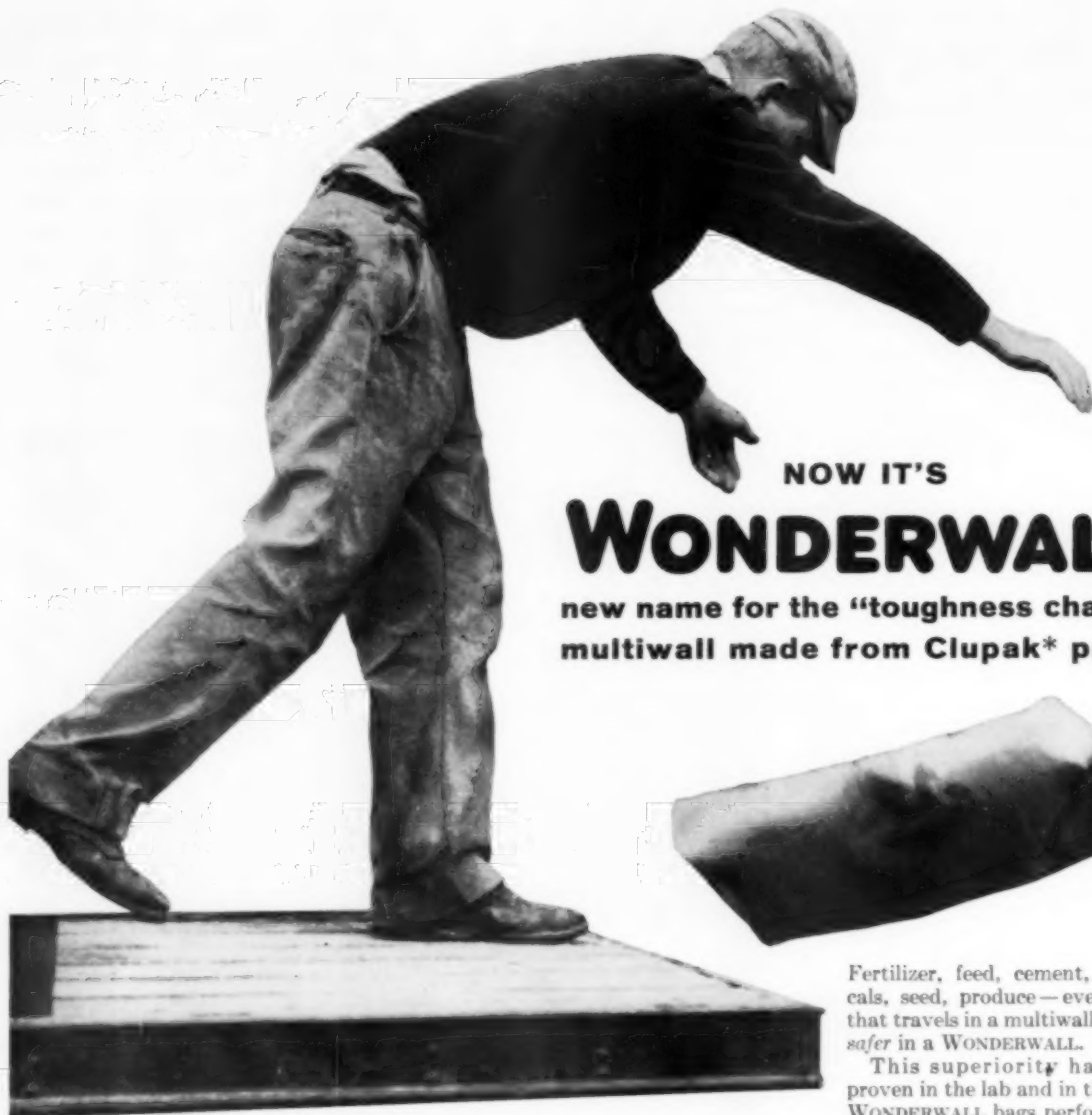
SUMMIT hydrous alumina silicates

Now . . . for the first time . . . Summit offers quality, test-proven hydrous alumina silicates in not one, but *three* separate products, each with its own controlled particle distribution for specific insecticide applications. Whether your choice is Summit SER-X, SER-A-SIL, or MICROCITE, you are assured of a product that:

- is free flowing.
- is highly inert with a neutral pH.
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- offers good wetting characteristics.
- has a flat particle shape.

Like to know more about these versatile materials? Write *today* for technical literature and samples.





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WONDERWALL®

new name for the "toughness champ"
 multiwall made from Clupak* paper

Fertilizer, feed, cement, chemicals, seed, produce—everything that travels in a multiwall travels safer in a WONDERWALL.

This superiority has been proven in the lab and in the field. WONDERWALL bags perform better because they're made of tougher Clupak paper—the paper that stretches. It absorbs impact without failing where ordinary kraft paper breaks.

WONDERWALL bags measurably reduce breakage. Also, they pack faster, handle easier, stack firmly . . . and they cost no more than old-fashioned bags.

For better efficiency and lower costs specify WONDERWALL, the bag that's making ordinary multiwalls obsolete. On your next carload, order a trial shipment of 5000 and see for yourself.

*Clupak, Inc.'s trademark for extensible paper manufactured under its authority.



MULTIWALL BAG DIVISION

WEST VIRGINIA PULP AND PAPER COMPANY

230 Park Avenue, New York 17, N. Y.

N.A.T.A. CONVENTION

(From Page 50)

pilot and one who plays an increasingly important part in agriculture. The financially irresponsible crop duster is being replaced by a sober, thinking businessman. The proposed CAB Part 75, he said, should be enacted so that the new businessman will have a sound basis on which to build and not be forced to operate under the present air show waiver. He said that 1,830 aerial applicators have a total of 76 million dollars tied up in equipment and deserve a better basis on which to operate.

(To be concluded next month)

WASHINGTON REPORT

(From Page 57)

While discussions are likely to continue mostly in the question-raising stage, some efforts are being started

to seek out the perfect insecticides—always fatal to insects, easy to produce and apply, and with no toxicity for man.

The questions being raised follow these lines: Are enough research facilities being devoted to seeking new sources for insecticides? Will discoveries come from basic research, from industry, from the Land Grant Colleges, or from some aspect of applied research?

Scattered research already is probing into the value of such widely different possible controls as viruses and parasites on one hand and dehydrating powders on the other. Research also is forging ahead in the field of new chemicals for agriculture.

* * * * *

Though relatively little is being said about it now, the bulk fertilizer business is expanding at a rapid pace. Farm managers report that larger farmers like the benefits of having fertilizers applied by nearly-automatic mechan-

cal equipment, and the savings they get on bulk prices as compared with bagged prices.

While some farmers are turning to group bulk applications, others are lining up in favor of aerial application. USDA experts now predict that you can expect a surprising boom in aerial application both of fertilizers and pesticides during the next few years.

Among the reasons are new aircraft specially designed to fly more slowly, take off and land in shorter distances, and operate even more safely than present craft. Another reason is the increased activity of the National Aviation Trades Association in persuading farmers that aerial application is effective, safe, and economical.

* * * * *

"Protecting Crops and Consumers," a long-awaited publication of the Federal Food and Drug Administration on pesticides, is now available. FDA hopes to get

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12-page leaflet to farmers via association, Federal Extension, and farm organizations.

Highlights of the leaflet are simple rules for growers (use pesticides only on crops recommended, in amounts specified, and at times specified on the label), and simple rules for the packer-shipper (find out if the grower followed label directions in applying pesticides, then follow good commercial practice with regard to washing, brushing, etc.).

Copies of the publication can be obtained by writing to the U.S. Food and Drug Administration, Washington 25, D.C., for FDA's leaflet No. 6, "Protecting Crops and Consumers."★★

ATOMIZING NOZZLE

(From Page 51)

treated, either alone or simultaneously with spray from the overhead nozzles by lowering the outlet position and directing the delivery of pest-control materials upward.

With a relatively few minor adjustments and modifications, it is believed that this equipment can readily be adapted to a large variety of low to medium height row crops such as bush beans, beets, lettuce, onions, and various cole crops for the application of pesticides.

Except for the nozzle adapter sleeve, which was of steel, the components of the experimental nozzle assembly were machined from brass. The reducer fitting and the nozzle body were machined from hexagonal bars and the stem from $\frac{3}{8}$ -inch round stock. Nozzles with adequate filter screens may be obtained from a spray-equipment dealer.

The vapor-spray nozzle assembly was tested extensively during 1957 in experiments conducted in the Columbia Basin of Washington for control of the green peach aphid on potatoes. The nozzle performed well in practice, held up well, and, with a size 7 orifice, gave

a fine, atomized spray at one gallon per acre per nozzle which distributed itself well through the foliage. With respect to foliage penetration and coverage, especially of the under surfaces of the lower leaves, the atomizing nozzles with the air blast seemed to be superior to the flat-spray nozzles of conventional design at the same overall gross rate. Aphid control results with the vapor-spray nozzle also appeared to average somewhat better than with the regular flat-spray nozzle.

Two series of tests were conducted to determine the effect of rate on insect control. In both series, atomizing nozzles were mounted in the dust-tube outlets and used in conjunction with flat sprays from the overhead branches. In one series, size 7 atomizing nozzles were used. In the second series, size 12 atomizing nozzles.

The respective application rates of the two combinations were approximately 16 and 20 gallons per acre. At the higher volume, and with somewhat coarser drop-let size, results were substantially better than at the lower gross rate with the smaller orifice and finer spray. Thus, two applications of endrin (0.5 pound net per acre per treatment) with the coarse vapor spray from size 12 nozzles at 20 g.p.a. gave an average population reduction of 98 per cent as compared with 91 per cent for three applications of the fine vapor-spray from size 7 nozzles at 16 g.p.a. For the green peach aphid, the minimum gross rate for efficient results appears to be approximately 20 gallons per acre.★★

TRYBEN 200

(From Page 36)

wild roses (especially McCartney or Cherokee), sumac, persimmon, sassafras and hackberry. For these species, thorough spraying of foliage and stems, as well as the ground under the plants, is recommended.

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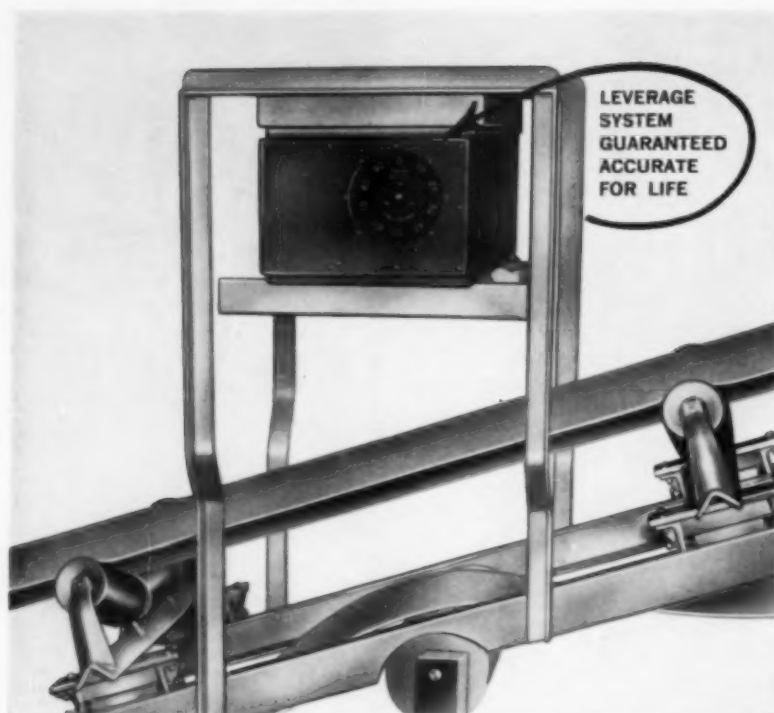
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OZOBAN FOR '59

(From page 35)

Ozoban is a mixture of 68% ascorbic acid, 26.5% anhydrous inert ingredients. When dissolved in water, Ozoban yields a solution of potassium ascorbate ready for spraying, using standard spraying equipment. In work done at Riverside, 100 gallons of Ozoban solution were used to cover one-half acre of romaine lettuce. The proper use-level must be established, say Pfizer spokesmen, since the quantity needed per acre will vary with the type and age of plant treated.

Some 26 plants—including alfalfa, beets, grapes, roses, tomatoes and radishes—are known to be subject to smog damage. Ozoban is now being evaluated, in further California research, for possible use on many of these plants as well as citrus.

Ozoban has had no deleterious effect on plant tissue in tests to date. Its chemical ingredients yield a solution of potassium ascorbate. When sprayed on vegetation, Ozoban enters the plant cells, giving resistance to the toxic effects of ozone and oxidized hydrocarbons.

Ozoban is readily soluble in water. There is some effervescence for a short time as the product dissolves. Ozoban solutions are somewhat sensitive to oxidation by air. Contact with metals

AGRICULTURAL CHEMICALS

such as iron or copper accelerates the oxidation and, if possible, solutions should be prepared and used the same day.

The new chemical is being marketed through regular distributors in 5-and 10-lbs. canisters, polyethylene-lined. Growers are advised to store in a cool, dry place, and to keep the container tightly closed when not in use.★★

FERTILIZER VIEWS

(From Page 59)

farmers buy only straight or single fertilizers the difficulties can be overcome by laying down rigid specifications for each class of fertilizer, and prohibiting the sale of substandard materials.

"The farmer, analyst and manufacturer may perhaps sum up his needs by saying that he looks to the soil chemist to give him good methods for estimating the amount of available phosphoric acid in fertilizers. Indeed, the American fertilizer trade is carried out almost exclusively in terms of the so-called 'available phosphoric acid'. I personally hope that this expression will not be introduced into British practice, because it has erroneous implications. The amount of the fertilizer phosphorus actually available to a crop depends not only on its conventional solubility, but on a host of other factors. It will vary with the kind of soil and crop, the weather, the method, and time of application, and so on. Non-committed terms such as 'readily soluble', 'water-soluble', 'citric-soluble' or 'citrate-soluble' are much to be preferred to the ambiguous term 'available'.

"Although it would be convenient to have a universal method of analysis for measuring 'readily soluble' fractions, there is considerable risk in treating any test too rigidly. The neutral ammonium citrate method used in the United States until 1931 appeared to be weighted against the ammoniated superphosphates which were then being made in rapidly increasing amounts. The method was re-

viewed and modified.

"There are certainly conditions in which conventional analytical methods introduced for specific purposes may become antiquated and prove an obstacle to progress. Useful as the water solubility test may be as a check on the efficiency of making superphosphate, there is an urgent need for one or more alternative methods to estimate the readily soluble phosphate in other kinds of fertilizer.

"The main difficulty in improving analytical methods and in introducing new kinds of fertilizer is the lack of a sufficient body of data on the relative values of various kinds of phosphate fertilizer over a range of agricultural conditions. Most of the American experience seems to have been limited to pot experiments. Far more field experiments are needed in this country on alternative kinds of fertilizers and especially on their residual effects. Test work is

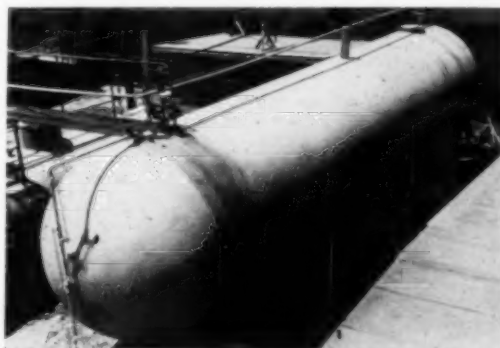
also needed to compare occasional heavy dressings against frequent small dressings suitably timed and placed. The main object of fertilizer analysis should be to help farmers to get the right sort and the amount of fertilizer in the right place at the right time. The precise strength of the fertilizer may be of quite secondary importance." ★★

PUBLIC RELATIONS

(From page 54)

is taking place, what materials are going to be used, what precautions are being taken in their use, and what has been the success of similar programs in other areas. With this understanding there is less likelihood of minority groups gaining control of public opinion.

The emergency message is one instance in which the newspaper will go to the applicator for the story. When such things as aircraft accidents occur, they are of



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interest to everybody, despite the fact that a custom applying concern might not be anxious to have them publicized. The editor is going to report on an accident and if he cannot get the story from the applicator, he will get it from somebody else. The important thing, in this instance, is for the custom applicator to give him the story so that at least it will be factually correct.

When preparing a story for consideration by an editor, there are a few rules to be followed. If possible, a story should be written in advance and submitted as quickly as possible. It should be typewritten and double spaced. The name, address, and telephone number of the author should be attached in case the editor has some questions or would like some more information. A news story is based primarily on facts and their sources. Sentences should be kept short and people's names should be used wherever possible.

If a town has more than one newspaper, the story should be sent to both of them with a notation saying this is being done. Pictures should be glossy prints and the subjects should be doing something interesting rather than just looking at the camera.

In writing a story it often is helpful to look at the newspaper for which it is intended and follow its style. Traditionally, newspapers tell the story in the first paragraph by answering the questions of the five W's and an H. For example: "Delux Spray Service (who) at Ashtabula (where) assisted in saving a corn crop (what) yesterday (when) by an emergency aerial application (how) to halt a chinch-bug attack (why)."

Obviously, the details of business come first but there are likely to be occasions when news worthy items can be passed along to the newspapers and, by the way, local radio stations. By taking advantage of these occasions and making the

effort, the custom applicator can bring himself to the attention of more people. With attention comes more business.★★

FOREST PESTS

(From Page 29)

Some of our most destructive forest pests have come from foreign shores. Examples are the chestnut blight, the white pine blister rust, the European pine shoot moth and the gypsy moth.

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NO matter how well and thorough the job of checking pests by the indirect measures, we can seldom count on such methods to accomplish the entire job, because our present knowledge about the manipulation of cultural measures and biological controls provides but a partial answer for stopping destructive pests. Where nature fails and valuable forests are threatened, direct control action is called for. Most major destructive insects are now combatted by direct measures. Direct control usually involves the use of chemicals.

To Be Concluded Next Month

TRENDS IN AGRICULTURE

(From Page 45)

There are other highly competitive fields in agriculture. Some take for granted that fertilizer and farm equipment suppliers normally set up "farmer-dealers," but scream "unfair competition" when this happens in other lines. We fail to recognize that in some areas there are more suppliers than there are dealers, with the resulting battle of the "ins" and the "outs". Normal distribution channels can be used only when there are no more suppliers of a chemical than there are channels. This is a problem of very simple arithmetic.

In conclusion then, let us face the facts as they exist.

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ness whether we wish to admit it or not. The farmer in the top 10% bracket is in an extremely good purchasing position and, in many cases, the credit risk is better with him than with his dealer.

When the number of suppliers is greater than the number of distribution outlets, then we find farmer-dealers and direct selling at wholesale prices to large farmers.

The distributing function has been confused with the manufacturing and supply function insofar as our industry is concerned. Firms with a research and manufacturing overhead cannot compete in low cost distributing functions, and over the past few years the cleavage between research and manufacture on the one hand and distribution on the other hand has become quite clear.

There is an old saying in Wall Street - "Never Buck a Trend". Many of the difficulties of our industry over the past ten years or so have resulted from continued

efforts to "Buck the Trend". The economic trends in agriculture are massive and inexorable in their direction and speed. We cannot stop them or change them. Our job is to recognize them and take advantage of them. ★★

FERTILIZER SAFETY

(From Page 93)

the importance of indoctrinating every worker in all the hazards of his job.

Grayson D. Morris, of Southern States Cooperative, Richmond, Va., told of a man who was assigned to disconnect the hose from an emptied ammonia tank car. The valve wouldn't bulge, so he called on two men nearby to hold the wrench. The valve broke and fumes caused suffering to the eyes of the men. Examination of this valve showed that it was in perfect condition, but that it had been attached by only three of the top threads.

The improperly installed valve was an unsafe condition, Mr. Morris pointed out. In addition, the men who were trying to perform an unfamiliar task, had failed to use protective equipment.

Last of the eight-man panel was W. A. Stone, superintendent, Wilson & Toomer Fertilizer Co., Jacksonville, Fla. who had another familiar story. A lump of material had jammed the flow to a feeder bed, and a man was directed to go up and dislodge the obstruction. For this a rod is provided, but this fellow decided to do it otherwise. He stuck his hand in and it was caught and crushed between the lump and the feeder belt.

Considerable clarifying discussion from the floor followed the panel presentation, with special interest in personnel and public liability angles of the cases reported. In general, it was agreed before adjournment, that this unusual program feature had been one of the most helpful and thoroughly

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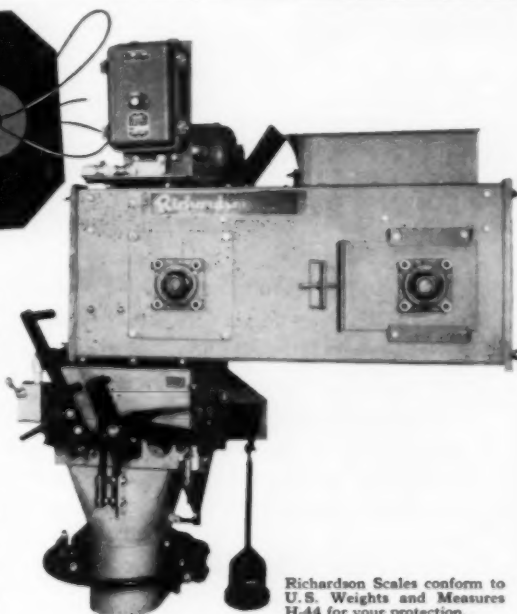
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INJECTION FEEDING

(From Page 37)

cally a nutritional ill, and is due most frequently to shortages of iron.

A curious thing about chlorosis is the fact that it can occur where soil tests indicate an abundance of iron in the ground. Researchers concluded some time ago that this was attributable to the fact that the natural iron content of soil was not in a form plants could use, and since then much progress has been made in the treatment of early-stage chlorosis with ground-dispersed fertilizers like iron chelates.

However, there is still no good substitute for injections in the treatment of trees which are in the advanced stages of chlorosis.

Evidence of the dramatic results that are obtainable where chlorotic plants are nourished by injectants can be cited by Mrs. Mary Beth Klier, owner of an avocado ranch at La Habra Heights, Calif. She had almost 40 trees in the final stage of chlorosis, yet each was producing healthy new growth within two weeks following its injection with iron chelates!

It is further interesting to note that injectants in small quantities can be used to diagnose the nutritional deficiencies of certain plants, where it is desirable to use more conventional fertilization methods.

For instance, gravity feeder cups containing small quantities of various nutrients can be mounted over injection tubes on several limbs of a tree; and, because the limbs will quickly absorb the most-needed nutrient or nutrients, fertilization requirements can be computed accurately in a few days.

The greatest danger of injection feeding is attributable to the possibility of over-fertilization, which is relatively rare where ground feeding methods are employed. This danger is not great

where established injection methods are conscientiously employed, but it is a notable fact that even a slight excess of injectant can produce adverse effects. A little too much iron, for instance, can temporarily defoliate a fruit tree.

Another injection feeding drawback that is frequently mentioned by growers is excessive scarring. But where the right tools have been properly employed, scars due to injections and careful pruning are usually indistinguishable.

Cost is the most valid objection to injection feeding; for, while it is now inexpensive in one sense of the term, it cannot compete with natural feeding methods where the latter are sufficient. However, there are circumstances where natural fertilization is impractical.

Many shade trees growing in such public places as parks must be nourished with injectants, for example, because their roots are almost completely covered with concrete. In cases of this type, one of the better general-purpose nutrients is Stemix—a dispersion containing iron, zinc, manganese, copper, molybdenum, and boron—made by Kap-Sol Corp., Los Angeles.

Comparisons between injection and leaf feeding methods are somewhat difficult to make, because each has its rightful place in the modern grower's bag of tricks. However, it might be pointed out that:

(a) Neither procedure gives the desirable long-term, low-cost results of proper ground fertilization.

(b) Leaf nutrients can frequently be applied at a relatively low cost in solutions containing insecticides.

(c) Both leaf and injection foods tend to correct nutritional ills more rapidly than ground fertilization.

(d) Injectants bring the fastest response and can be employed where the condition of foliage prevents the effective use of leaf-borne nutrients. ★★

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Route 8, Township Road
Fayetteville, Arkansas
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Midwest Regional Office
(Formerly Middle West Soil Improve-
ment Committee)
Zenas H. Beers, director
228 North La Salle Street
Chicago 1, Illinois
Telephone: STate 2-9361



Snapshots taken at NAC's 25th annual meeting Oct. 29-31 Savannah, Georgia

(Story in *Agricultural Chemicals*,
Nov. 1958 issue, pp 36-39)

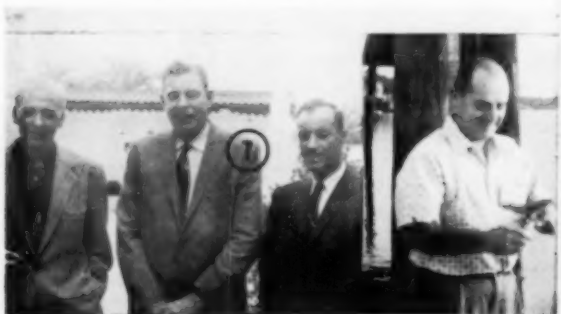


Photo Captions

- (1) L. K. Brunn, Atlas Powder Co.; Z. Z. Dworkin, Glenn Chemical Co.; and Paul Torpin, McLaughlin Farm Chemicals, Inc.
- (2) R. Peacock, General Reduction Co.; Ivor Burden, United Heckathorn Co.; J. B. Skaptason, Spencer Chemical Co.; M. Goldberg, Pesticide Advisory Service.
- (3) William Dixon, Dow Chemical Co.; John Plowden, Geigy Agricultural Chemicals; and J. Lawler, Shell Chemical Co.
- (4) J. Horsey, Eastern States Petroleum & Chem. Corp., R. Lamoree and H. Straube, both of Stauffer Chemical Co.
- (6) George Simches, Planters Chemical Corp.; John Stoddard, Prentiss Chemical Co.; W. Crown, Crown Chemical Co.; and A. Connelly, General Chemical Div., Allied.
- (7) John Rodda, Fairfield Chemical Co.; J. C. Walker, Frontier Chemical Co.; P. S. Catir, Eastern States Farmers Exchange; and R. Yates, Hercules Powder Co.
- (8) R. S. Thompson, Thompson-Hayward Chemical Co.; and Fred Shanahan, Pennsalt Chemicals Corp.
- (9) Roger Roth and John Kirk, both of Velsicol Chemical Corp.
- (10) J. D. Hopkins, Hopkins Agricultural Chemical Co.; S. H. Bear, Niagara Chemical Division; and John Rodda, Fairfield Chemical Div., FMC.

EDITORIAL

(From Page 27)

starts to go to the bottom bidder who may not be so dependable—who knows how much filler the buyer might get in lieu of plant food? What arguments might result in the fall when the crop was not up to expectations? And what proof would the fertilizer supplier have to offer that he had really delivered fair value?

Today approximately 85% of the dry mixed fertilizer used on the farm is bought in bags. We have an idea it will be a long time before there is any major change in present practice.★★

DELNAV

(From Page 36)

directly to dogs, as well as when applied as a premise treatment.

Delnav is available as a 47% (4 pounds per gallon) emulsion

CLASSIFIED ADVERTISING

Rates for classified advertisement are ten cents per word, \$2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, \$1.00 minimum. Check must accompany all classified advertisements. Address all replies to Classified Advertisements with Box Number care of AGRICULTURAL CHEMICALS, P. O. Box 31, Caldwell, N. J. Closing date: 10th of preceding month.

Situations Wanted:

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MARRIED VETERAN, age 24 currently studying Business Management, at night, desires to train as a salesman in an organization where achievement will be rewarded. Phone Butler 9-4714-J. (New Jersey)

concentrate. It is compatible with all commonly used insecticides and fungicides. Usual recommendations are one pint (½ pound actual Delnav) of emulsion concentrate per acre, or from ¾ to 1 pint per 100 gallons of spray in the case of fruit trees. Delnav has not been found to be phytotoxic on any of the many crops against which it has been tested.

While Delnav is not as toxic as some of the organo phosphate miticides, applicators are advised to use the precautions usually observed in handling toxic phosphate-type insecticides.

CCDA-NAC

(From Page 41)

tremendous market, said Mr. Taylor, exists for field nematocides inexpensive enough for application to crops having values of less than \$200 per acre.

For Sale:

FOR SALE: Rotary Dryers 7'6" x 55', (2) 6'8" x 65'; Ribbon Mixers 40 & 90 & 225 cu. ft., 1—10,000 gal. aluminum Storage Tank, Rotex & Tyler Screens single and double deck, Mikro Pulverizers, Raymond Mills, etc. Send us your inquiries. Brill Equipment Co., 2409 Third Ave., New York 51, N. Y.

SALE: Horizontal Aluminum Tanks 2,100, 4,000 gallons. Steam Tube Dryers (Tubes Removable) 6' x 50', 6' x 30', 4' x 30'. Ribbon Mixers 200, 75 cubic foot working capacity. Also Bucket Elevators, Screw Conveyor, Trough Conveyor, Hammermills, Pulverizers, etc. Perry Equipment Corp., 1428 N. 6th St., Phila. 22, Pa.

Sales Volume Down? — Sales Costs Up?

Obtain the advantages of a diversified sales organization. Let me handle your sales on a straight commission. Experienced in fertilizer materials, technical insecticides, herbicides and fungicides. Introduction of new products a specialty. No job too large or too small.

Reply Box 204, c/o Agricultural Chemicals.

Regarding the seed bed nematocides, Mr Taylor observed that although these are more than ten times as expensive to use as field nematocides, they have added advantages. (The seed bed nematocides are generally applied under plastic covers). Not only do these chemicals control nematodes, but also soil insects, some soil bacteria and fungi and weed seeds. This last feature is important because it eliminates costly hand weeding of seed beds.

Several underdeveloped markets for nematocides — underdeveloped because suitable products have not yet been found — include the control of nematodes in orchards, citrus groves, and vineyards. The problem is to kill the nematodes feeding in or on the roots yet leave the trees or vines without injury to the roots. No satisfactory materials are available, as yet.

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TALE ENDS

A host of new insecticides will be introduced to the market for the 1959 season. A representative group of the new products is described elsewhere in this issue (see page 34). One of the most interesting of the experimental materials is a microbial insecticide which has been under development for some time. *Bacillus thuringiensis* is the "live" ingredient. In tests by research workers at the University of California it outperformed conventional insecticides, reportedly giving kills of the

cabbage worm ranging from 80 to 100 per cent.

The Chemical Division of Merck & Co. developed the new product which will be field tested during the coming season. Other companies working on new microbial type insecticides include Bioferm Corp. of Wasco, California, and Nutrilite Products, Inc., Buena Park, California. Much of the test work on these new pesticides is being conducted by the staff of the Department of Biological Control of the University

of California, who have been screening in the field some of the products developed by commercial firms.

AC

Hormone insecticides, another new approach to the age-old problem of insect control were the subject of a few brief paragraphs in this column last month. They seem to be much further removed from the actual commercial stage, however. Articles on both types of pesticides are in preparation for coming issues of Ag. Chem.

AC

In years past tobacco stems were a commonly used fertilizer ingredient, but today they have been priced right out of the plant food market. They are now going into filter cigarettes, we are told, where they are needed to provide flavor. Demand for this purpose has pushed the price up to a level too high to permit use in fertilizer.

AC

One by-product of the recent election is a definite dimming of the prospect for any stricter tax controls on co-ops. Some commercial firms who compete with the cooperatives had been hoping for the passage of tax laws that would minimize the preferred tax-free status that co-ops now enjoy,—but no such measure is apt to get favorable action from the heavily Democratic Congress.

AC

As an example of the effect that competition from the co-ops is having on commercial fertilizer producers, it is significant that during the 1958 season one producer had to shut down a plant because it was unable to meet competition from tax-free cooperatives manufacturing ammonia.

AC

Bulk blending of fertilizers has been getting considerable attention recently. TVA has just reported on a survey it made in Illinois, where the practice of bulk blending straight materials has expanded greatly over the past ten years. In 1956, the report states, bulk blenders distributed 26% of all the straight fertilizer materials consumed in the state. *Successful Farming* ran a feature article on the subject in their November issue, while *Chemical Week* in their November 15th issue also reviewed the pros and cons in an article titled "Bulk Distribution: Next for Dry Fertilizer?" Bulk distribution will grow, say *Chem Week* editors, despite its drawbacks. "Cheaper handling, custom service, faster application and stronger, more competitive dealers will make a sales pitch that's tough to beat." For our own views on the subject, which are somewhat less enthusiastic, see our editorial (page 27).



— Leader in the Field —

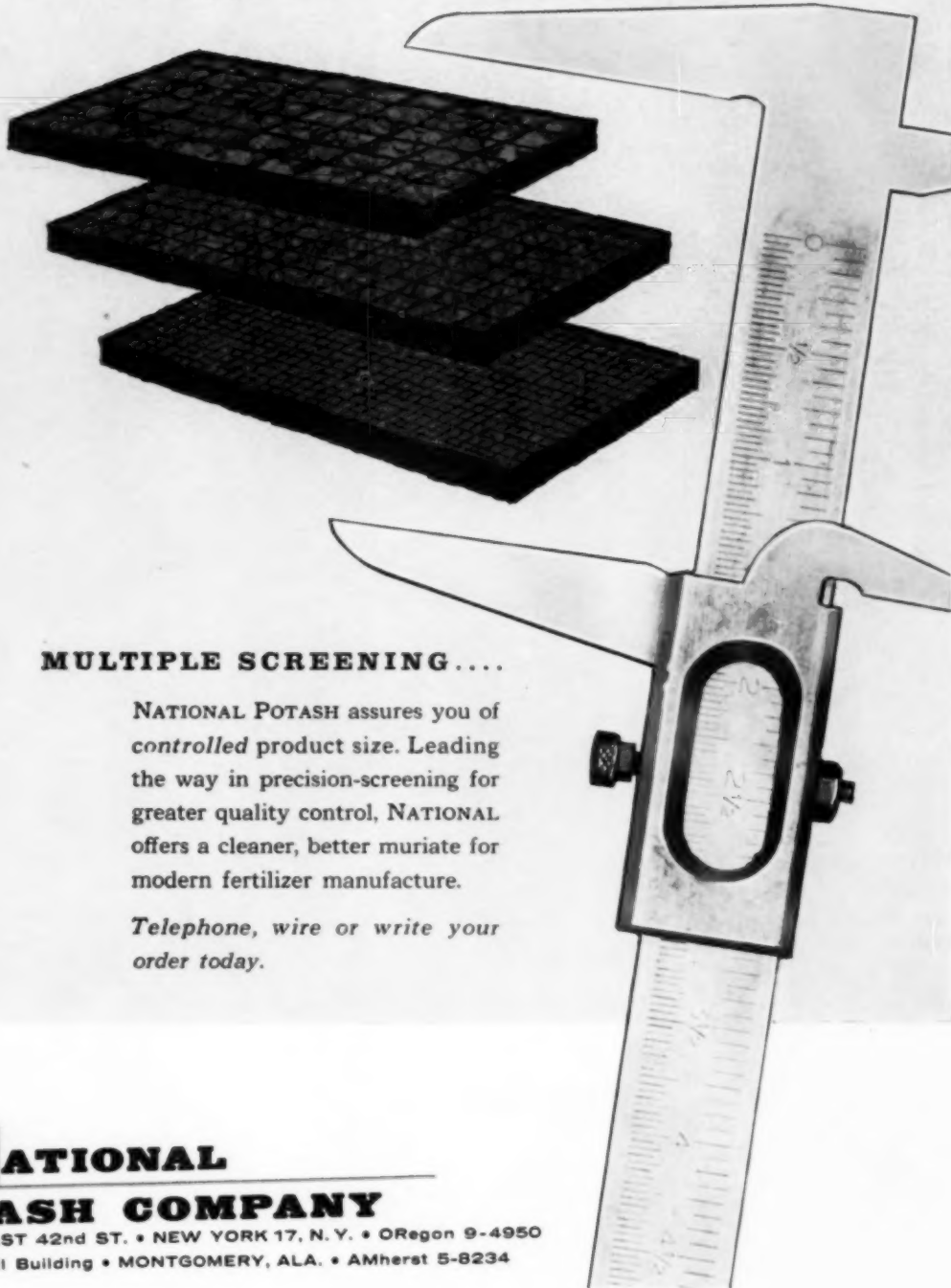
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